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Section 1 of 2

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WASTE RECEIVING AND PROCESSING PLANT CONTROL SYSTEM SYSTEM DESIGN DESCRIPTION

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Abstract: This document is intended to serve as the primary reference for configuration of the PCS computer systems.

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WASTE RECEIVING AND PROCESSING

PLANT CONTROL SYSTEM

SYSTEM DESIGN DESCRIPTION

HNF-3291, Rev. 0

December 1998

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Table of Contents

GLOSSARY

LIST OF TERMS

AGV	Automatically Guided Vehicle
AGVCS	Automatic Guided Vehicle Control System
AS/RS	Automatic Stacker/Retreival System
BWAS	Boxed Waste Assay System
CAD	Computer Aided Drafting
CH	Contact-Handled
COPRO	CoProcessor
DCS	Distributed Control System
DH+	Data Highway Plus
DMS	Data Management System
EMI	Electromagnetic Interference
FAP	Fission and Activation Product
FGE	Pu-239 Fissile Gram Equivalent
GEA	Gamma Energy Assay
HLAN	Hanford Local Area Network
HVAC	Heating Ventilation & Air Conditioning
ICMP	Internet Control Message Protocol
IRCOM	Infra-Red Communications System
LAN	Local Area Network
LCU	Local Control Unit
LLMW	Low Level Mixed Waste
LLW	Low Level Waste
LLWRWM	Low Level Waste Restricted Waste Management
MMI	Man-Machine Interface
MTBF	Mean Time Before Failure
NDA	Nondestructive Assay
NDE	Nondestructive Examination
OCS	Operator Control Station
OIU	Operator Interface Unit
P&D	Pickup and Dropoff (with reference to an AGV location)
PAM	Packet Assay Monitor
PAN	Passive-Active Neutron
PCS	Plant Control System
PE-Ci	Plutonium Equivalent Curies
PLC	Programmable Logic Controller
PMS	Plant Management System
RF	Radio Frequency
RTAP	Real Time Applications Platform
RWM	Restricted Waste Management
SGS	Segmented Gamma Scanner

SIE	System Integration Equipment
SWB	Standard Waste Box
TBD	To be determined
TCP/IP	Transmission Control Protocol/Internet Protocol
TRU	Transuranic
TRURWM	Trans Uranic Waste Restricted Waste Management
UDP	User Datagram Protocol
WAC	Waste Acceptance Criteria
WIPP	Waste Isolation Pilot Plant
WLAN	WRAP Local Area Network
WRAP	Waste Receiving and Processing

DEFINITION OF TERMS

CSMA / CD. Carrier Sense Multiple Access with Collision Detection, the Ethernet form of LAN data link technology, defined by IEEE 802.3 and ISO 8802-3.

Ethernet. A form of LAN data link that implements the IEEE 802.3 / ISO 8802-3 CSMA / CD standard. On an Ethernet LAN data link, stations are attached to a common transmission facility, such as coaxial cable or twisted pair cable, and a station typically attempts to transmit whenever it has data to send (see CSMA / CD).

ISO. International Organization for Standardization. The dominant information technology standardization organization in which individual members consist of individual national standards organizations. The ISO member organization from the United States is the American National Standards Institute (ANSI).

Internet. A term used to refer to a TCP / IP network that is typically constructed using individual physical networks that are interconnected using routers and possibly wide area network data links. Also refers to the world's largest TCP / IP network which interconnects thousands of networks containing millions of computers in universities, national laboratories, and commercial organizations. Sometimes called the Worldwide Internet.

Mbps. Megabits per second. Ethernet supports 10 million bits per second of transmission speed.

NIC. Network Information Center. The organization responsible for collecting and distributing information about TCP/IP protocols. The NIC is also responsible for assigning unique names and addresses to the networks and systems that will be connected to the Internet by individual organizations. The NIC is operated by Government Systems Inc. (GSI).

OCS. Operator Control Stations. Desk consoles located in the control room at which operators can monitor the processing facility via CCTV monitors, an X-terminal running RTAP and DMS applications, and NDE / NDA subsystems.

Packet. In TCP / IP, an informal name for the IP datagram handled by the Internet Protocol (IP). Also, an informal name for the data unit handled at the level of the OSI model

PIN. Package Identification Number. A Code 39 bar code label affixed to each drum, box, sample, or other item to be processed.

PMS. Plant Management System. (The combined computer systems for process control and data management, with which the SIE, PAN, and GEA communicate. The PMS comprises the DMS and PCS.

RFC. Request for Comments. Documents available on the Internet, maintained by the NIC, that document TCP / IP protocols and contain information of interest concerning Internet.

RTAP. Real-Time-Applications-Platform. An Graphical User Interface developed by Hewlett-Packard that runs on top of X-Windows that allows users to visually interact with a graphical representation of the process.

SNMP. Simple Network Management Protocol. An architectural approach to the problem of managing large internets than is provided by ad hoc tools.

Subsystem. A single computer system within the Plant Management System, the PCS, DMS, SIE, PAN, and GEA are all subsystems.

Telnet. A client-server TCP / IP application allowing users on a local host computer to login to a remote host.

XDR. External Data Representation Protocol. A standard method for encoding argument data and results so they can be used in a portable fashion in an heterogeneous host environment.

X-Windows. A windowing operating environment developed at Massachusetts Institute of Technology (MIT) for UNIX computers, very similar to Microsoft Windows for Personal Computers.

1.0 INTRODUCTION

The Plant Control System (PCS) is a heterogeneous computer system composed of numerous sub-systems. The PCS represents every major computer system that is used to support operation of the Waste Receiving and Processing (WRAP) facility.

This document, the System Design Description (PCS SDD), includes several chapters and appendices. Each chapter is devoted to a separate PCS sub-system. Typically, each chapter includes an overview description of the system, a list of associated documents related to operation of that system, and a detailed description of relevant system features. Each appendice provides configuration information for selected PCS sub-systems. The appendices are designed as separate sections to assist in maintaining this document due to frequent changes in system configurations.

This document is intended to serve as the primary reference for configuration of PCS computer systems. The use of this document is further described in the WRAP System Configuration Management Plan, WMH-350, Section 4.1.

Table of Contents

2.0 SYSTEM OVERVIEW

2.1 DEVELOPMENT INFORMATION

The PCS is divided up into many modules to aid in development, testing and commissioning. The submodules, reside on one of several platforms.

The first platform is the PLC located in each Local Control Unit (LCU). Within the PLC there are two locations for software modules to reside: the main programmable logic controller (PLC) and the communications co-processor (COPRO). The COPRO is a module designed for serial communications. It has several additional serial communications ports for interfacing with serial devices.

Most modules reside in the PLC and are developed using Rockwell Automation WinLogix development software. This software is a Windows package, which allows development of ladder logic programs for the PLC. The ladder logic is industry standard.

The software application running on the COPRO modules is called "SERCOM." There are two SERCOM applications. One application is running on LCU 101, 102, and 103. The second application is running in LCU 104. These modules are all written in C for the OS-9 operating system. The Sercom modules were developed using FasTrak for Windows by Microware Systems, version 1.2, (515) 224-1929.

The PCS contains one Allen-Bradley 2760-RB Flexible Interface module, (RB module) which resides in the PLC of LCU 103. The RB module is responsible for communications with the fixed bar code terminals. The RB module is not programmed but is configured. The "Fixed Bar Code Processing" module uses the RB module to communicate with the fixed bar code terminals.

The Man Machine Interface (MMI) is Hewlett Packard's Real Time Applications Platform (RTAP). The remainder of the modules will reside on the PCS server and will be developed using ANSI C with the RTAP Developers library. All functions provided by RTAP are the standard components.

2.2 PLANT MANAGEMENT SYSTEM OVERVIEW

The Plant Management System includes both the Plant Control System (PCS) and Data Management System (DMS). The Plant Management System (PMS) communicates between devices via the WRAP Local Area Network (WLAN), an Ethernet Local Area Network in a star topology. The base of the star is a Cabletron concentrator that handles all of the routing of data between the legs of the star. The devices on the network communicate using TCP/IP, an industry standard communications protocol. The WLAN is linked to the Hanford Area LAN but is

isolated from it by the intelligent concentrator. The PCS and DMS are the only two devices that can communicate on both WLAN and HLAN.

2.3 DATA MANAGEMENT SYSTEM OVERVIEW

The DMS server (202-CPU/DRV-12-109) is the server for the Data Management System. Access to the DMS is through terminals located on the plant floor (101-TE-12-103/104/124), Shipping/Receiving terminal (101-TE-12-108), Sample Management terminal (109-TE-12-107), RWM Monitors (107-OIU-12-105A/106A) and through the Operator Control Stations located in the Computer/Control Room (201-CNS-12-10x). Please consult the Data Management System (DMS) Software Design Description Document for additional DMS information. 1

2.4 PLANT CONTROL SYSTEM OVERVIEW

The PCS server (202-CPU-12-110) is the central server for the PCS and provides all of the processing power and data storage for RTAP and communications to the other devices on the WLAN. Primary access to the PCS server is provided through X-Terminals (201-CNS-12-10x). There is also a system console (202-TE-12-110) which allows text only access to the server to support administrative functions. Alarms, which originate from RTAP, are printed on a high-speed line printer (201-PR-12-110).

Plant equipment is controlled by the PLCs located in the LCUs. The PCS Server is used as a Man-Machine Interface and communications server. The LCUs send status information to and receive operator commands from the PCS server. The LCUs also communicate with local devices via serial communications networks for control purposes, in addition to the hardwired controls. The functions of the LCUs are divided by location to allow each LCU to control a specific area.

Each LCU is linked into the WLAN via an integral Ethernet interface built in to each PLC. Devices that are controlled locally by an LCU are connected to that LCU via a serial connection, either RS-232, DH+ (Data Highway Plus or DH485). Data Highway Plus™ is a proprietary Allen Bradley multi-drop communications protocol for use with RS-485 data links. DH485 is a subset of Data Highway Plus communications Protocol.

The Operator Interface Units (OIUs), that are used to operate equipment are connected to the PLCs using a Remote I/O link.

2.4.1 NETCOM Overview

NETCOM is the communications module that translates messages between the PLCs and the other devices on the LAN, including the portable bar code terminals. NETCOM is written in C using the Hewlett Packard C compiler. When a PLC needs to send a control message to a device such as the AGVCS, the PLC will send the message to NETCOM. NETCOM will process the message and send it on to the device. Any messages from a device such as the DMS server, to the PCS are processed by NETCOM. NETCOM determines which PLC to send the message to, NETCOM processes the message for the PLC, and then NETCOM sends the message to the PLC. NETCOM monitors the condition of the communications links that it uses and passes that information on to the RTAP database for display.

Status information to be used by the RTAP system is transmitted via the Allen-Bradley provided module NET_DTL and the HP Scan System. These two modules work together to convert the data stored in the PLC in the form of bits and bytes into entries in the database. Data is stored in each PLC in "memory registers". The required registers are linked to entries in the database using the Scan System. The PLCs are periodically polled by the Scan System to retrieve new data values. These values are displayed graphically by RTAP for the operator. Any control commands from the operator are entered into RTAP (by the operator pressing buttons and entering values on the screen) and sent to the PLC. The PLC will then send a control message to the device being controlled via NETCOM or will initiate a hardwired control sequence.

The general data flow is the same for all four PLCs in the PCS. Within each PLC are several control submodules. Each control submodule consists of a program file and one or more data files within the PLC. A control submodule has local control responsibilities over a certain area or piece of equipment (e.g. AS/RS, NDE/NDA Transfer Conveyors). No other submodule is allowed to control the same equipment. Each control submodule can generate and receive NETCOM messages, bar code information, and communicate status with RTAP. The data path for RTAP information, equipment status and operator commands are via the HP Scan System through NET_DTL and directly into the command submodule's data file(s). This is a polled operation.

Messages to/from other devices that are handled by NETCOM are generated by each control submodule. Message passing and handshaking is handled by the supervisory control submodule. There is one supervisory control submodule located within each PLC. It is the responsibility of the supervisory control submodule to temporarily buffer outgoing and incoming messages and to route incoming messages to the proper control submodule.

Messages to and from the bar code equipment are placed directly into the data file of the associated control submodule. Each bar code terminal has a location associated with it, either permanently for fixed terminals or dynamically for portable terminals. NETCOM uses the location to determine which control submodule of which PLC the bar code data should be sent to. Conversely, the location is used by the control submodule to send user prompts out to a specific bar code terminal, via NETCOM.

2.4.2 SERCOM Overview

SERCOM is a computer program that governs how each LCU communicates with local devices via RS-232 and RS-422 serial interfaces. SERCOM is written for the AB-1771 Communications Co-Processor using the C programming language. SERCOM runs on the PLC coprocessor using the OS9 operating system. The control submodule responsible for each device assembles control commands for that serial device. These commands are passed to SERCOM using a shared data file. SERCOM does the necessary formatting of the message and transmits the message to the device.

There are two SERCOM versions. One version runs on the COPRO in LCU 101, 102, and 103. The second version runs on the COPRO in LCU 104 and only interfaces to the HVAC Distributed Control System (DCS).

Status messages from the serial device are received by SERCOM and converted into a form that each PLC control submodule can use. The converted data is then placed into the shared data file for use by the control submodule.

2.4.3 Bar Code System Overview

Barcodes are used at Waste Receiving and Processing (WRAP) to track waste containers through the plant.

The Plant Control system utilizes both fixed and portable bar code scanners. Fixed bar code scanners are linked to an Allen-Bradley 2760-RB module that is located in the LCU 103 PLC. The RB module handles communications with the fixed bar code terminals. Portable bar code terminals communicate using spread spectrum radio to a network controller via one of three transceivers. Each portable bar code terminal is connected to the PCS server via telnet session through the network controller.

Operators are prompted via messages displayed on the portable terminal. Prompting is provided via the control submodule that is connected to the terminal. NETCOM passes the prompts on to the terminal and handles the communications link between the PCS and the terminals. Bar code data scanned by the terminal is sent to the submodules located in the PLCs of LCU 101, 102 and 103 via NETCOM. The location of the bar code terminal determines the PLC submodule that handles the processing. Each submodule that uses bar codes has a bar code processing routine.

All fixed bar code terminals are tied into the PLC of LCU 103 via the RB module. The bar code controller passes data from the terminals to the fixed bar code submodule in the PLC and back from the fixed bar code submodule to the bar code terminals passes data both ways between each terminal is identified by a unique address (called the terminal ID) which is passed with every message. The fixed bar code submodule assembles user prompts for the terminals based on data received from the controlling submodule, which is relayed via NETCOM.

The PLC in LCU 103 passes scanned bar codes received from the terminals to NETCOM, which then routes the bar code messages to the proper submodules in the PLCs of LCU 101, 102, 103, and 104. The location of the bar code terminal (determined by the terminal ID) determines the PLC submodule that handles the processing.

2.4.4 Automated Guided Vehicle Control System Overview

The Automated Guided Vehicles (AGV) are used to automatically transport drums to and from analysis processing stations at WRAP.

The AGV is controlled by sending and receiving command and status messages between the PCS and the Automated Guided Vehicle Control System (AGVCS). These messages include: pick up and drop off requests, pick up and drop off commands, status messages, release messages, etc.

Each submodule that has AGV interaction generates its own AGV commands which are passed on to the supervisory control submodule and then on to NETCOM and finally to the AGVCS. Conversely, messages from the AGV are handled by NETCOM and passed to the supervisory control modules of the PLCs.

2.4.4.1 Picking-Up A Drum

- The AGV arrives at the pick-up/drop off (P&D) station, turns on its conveyor and turns on its IRCOM light.
- The PCS receives the AGV light, starts its conveyor and turns on its IRCOM light. See Note 1.
- The AGV senses the drum, stops its conveyor and turns off its IRCOM light.
- The PCS senses the AGV light off, stops its conveyor and turns off its IRCOM light. See Note 2.
- The AGV senses the PCS light off and proceeds to its next task.

NOTES:

1. When picking-up a drum from a PAN or GEA vault, after the PCS receives the AGV light, the PCS will send the Ready to Pickup Drum, Start Conveyor message (Netcom message 5.11.3 for PAN, 5.13.3 for GEA) to the vault in addition to starting its conveyor and turning on its IRCOM light. This will prompt the vault to begin the transfer.

2. When picking-up a drum from a PAN or GEA vault, after the transfer is complete, the PCS will also issue a Stop Drum Transfer Conveyor (due to drum out) message (Netcom message 5.11.5 for PAN, 5.13.5 for GEA) to the vault.

2.4.4.2 Dropping-Off A Drum

- The AGV arrives at the P&D station and turns on its IRCOM light.
- The PCS receives the AGV light, starts its conveyor and turns on its IRCOM light. See Note 1.
- The AGV receives the PCS light and starts its conveyor.
- When the drum has been sensed at the P&D station, the PCS stops its conveyor and turns off its IRCOM light. See Note 2.
- The AGV senses the PCS light is off, stops its conveyor and turns off its IRCOM light
- The AGV proceeds to its next task.

NOTES:

1. When dropping-off a drum at a PAN or GEA vault, after the PCS receives the AGV light, the PCS will send a Request to Drop-off Drum message (Netcom message 5.11.3 for PAN, 5.13.3 for GEA) to the vault. Only after the vault responds with a Ready to Accept Drum Transfer, Conveyor Started message (Netcom message 5.12.2 for PAN, 5.14.2 for GEA) will the PCS start its conveyor and turn on its IRCOM light.

2. When dropping-off a drum at a PAN or GEA vault, the drum presence is sensed by the receipt of a Drum Presence Sensed in Station, Conveyor Stopped message (Netcom message 5.12.3 for PAN, 5.14.3 for GEA) from the vault.

In the above sequences, there is only one (1) IRCOM light (transmitter/receiver pair) required on both the PCS and the AGV roller deck. The AGV Control System will issue an AGV Location Update message to the Plant Control System (PCS) over the WLAN upon arriving at a P&D station. The message will inform the PCS whether the AGV is picking up or dropping off a drum which allows the PCS to run the conveyors in the proper direction and check for errors (such as a drum already existing on a conveyor with the AGV attempting to drop one off).

2.4.5 Nondestructive Assay Overview

The Nondestructive Assay (NDA) is used to measure the composition and quantity of radionuclides present in waste containers.

The NDA equipment includes the two Passive/Active Neutron (PAN) stations (A & B), two Gamma Energy Analysis (GEA) stations (A & B), and the TRU Packet Assay Monitor (PAM) station. These devices are all linked to the WRAP LAN. Messages for the NDA equipment is generated by the control submodule responsible for control of the device. The messages are passed on to NETCOM for routing to the device being controlled. Status messages from the NDA equipment are received by NETCOM and routed to the control submodule controlling the device.

The control modules for the PAN and GEA stations are located in the PLC of LCU 101 and the control submodule for the TRU PAM is located in the PLC of LCU 103.

2.4.6 Automated Stacker/Retriever System Overview

The Automated Stacker/Retriever System (AS/RS) is used to temporarily store drums at WRAP.

Commands to the AS/RS and status messages to the DMS about the AS/RS originate in the AS/RS control submodule located in the PLC of LCU 104. Portable bar code readers are used to initiate AS/RS automatic sequences such as storing and retrieving drums. The messages are passed to NETCOM, which then routes the messages and ensures that the messages are delivered.

Status messages from the AS/RS are received by NETCOM. NETCOM converts the messages for the PLC and passes the message on to the PLC.

2.4.7 Local Control Unit Overview

Each programmable logic controller (PLC) is capable of having up to sixteen (16) active main control programs and 1000 data files. Each main control program is a ladder logic program contained in a program file and can be as large as the memory available in the PLC. The ladder logic program files can be numbered 2 - 999, and each data file can be up to 1000 words in size.

Each control submodule is contained within one main control program (ladder logic program file). Associated with each control submodule is up to ten (10) data files. The data file numbers correspond to the program file number with 0-9 added on to the end. For example:

Drum Scale Conveyor B: Program File 11
Data File 110 through 119

Each PLC in LCU 101, 102, 103, and 104 has the ability to communicate with other LCU PLCs via WLAN. Other PLCs (i.e., Supercompactor, Empty Drum Compactor, Drum Storage Carousels) are not networked with WLAN. The LCU 101, 102 PLCs can communicate with specific non-networked PLCs using Data Highway Plus serial communications messaging.

Use brief version of 101-104 overview as brief introduction, e.g.,

4 LCU PLCs
LCU 101 – S/R, NDE/NDA Areas
LCU 102 – LLW Gloveboxes, Airlock

Each PLC has the ability to directly communicate with one or more devices. The PLC utilizes a communications co-processor to directly communicate with each device. Commands and data from the PLC are first sent to the co-processor for conversion. The coprocessor assembles the data and/or command to form a message and then sends that message to the device. Status messages from the devices are decoded by the coprocessor into data that is passed on to the PLC.

2.4.7.1 Local Control Unit 101

The LCU 101 files support the Shipping/Receiving and NDE/NDA areas of WRAP. This includes the Receiving Dock, Drum Infeed Conveyor A and Drum Scale/Conveyor A in the Receiving area. The Shipping file supports the Drum Scale/Conveyor B and all shipping areas. The NDE/NDA file supports all NDE and NDA equipment.

2.4.7.2 Local Control Unit 102

The LCU 102 files support the LLW and LLW RWM glovebox operations. In addition, LCU 102 files support airlocks, LLW and LLW RWM lift tables, and the RW Drum Carousel.

2.4.7.3 Local Control Unit 103

The LCU 103 files support the TRU and TRU RWM glovebox operations. are for the TRU processing lines. This also includes support for TRU and TRU RWM lift tables, empty drum storage conveyors, and all WRAP fixed bar code processing.

2.4.7.4 Local Control Unit 104

The LCU 104 files support WRAP utility systems including the Heating Ventillation and Air Conditioning (HVAC), Health Physics, Electrical system and other miscellaneous systems. In addition, AS/RS activities are supported via LCU 104 files.

2.5 REFERENCES

1 M. E. Palmer, October 1994, *WRAP Data Management System Software Design Description*, HNF-SD-W026-SDD-030, Fluor Daniel Hanford, Inc. Richland, Washington

Table of Contents

List of Tables

3.0 RTAP

3.1 RTAP ENVIRONMENT DIRECTORIES

The RTAP environment is defined in directory /users/WRAP1/rtap_env. Table 3-1 outlines the directory structure used to store the WRAP RTAP environment. For more details of how each directory is used by RTAP, please refer to the RTAP manuals.1

Table 3-1. RTAP Environment Directories

Directory Tree			Description
/users/WRAP1/RTAP_env			1. WRAP RTAP Environment root
	Symbols		2. symbols root
		Electrical	3. electrical symbols
		Process_Control	4. process control symbols
		Misc	5. miscellaneous symbols
		Wrap	6. WRAP specific symbols
	Panels		7. Panels
	Schematics		8. Schematics
	Reports		9. report definitions
	Images		10. images
	RTAP Security		11. security definitions

3.2 RTAP Environment Table

The startup of RTAP is controlled by the environment table. Table 3-2 is an example of an RTAP environment table.

Table 3-2. RTAP Environment

```
#
# RTAP/PLUS ENVIRONMENT TABLE
#
# This file contains the RTAP Environment Table.  It defines the
# processes that RTAP knows about and that require some special action
# at startup or shutdown.
#
# This file may contain comments but ONLY IF THEY START THE LINE.  Embedded
# comments (i.e. at the end of a line) DO NOT WORK.  Everything from the
# command to the end of line is interpreted as arguments to the command.
#
# The columns are as follows:
#
#       1 - PROCNUM (preassigned if non-zero)    (0, 1-255)
#       2 - Autostart phase (0 = no start)       (0, not 0)
#       3 - Autostart as user 'RTAP'             (No, Yes)
#       4 - Restart on termination               (No, Environment, Program)
#       5 - Multiple copies allowed              (No, Yes)
#       6 - Cleanup on termination               (No, Yes, Abnormal)
#       7 - Care about process deaths            (No, E,L,M,P,R,W, Yes)
#       8 - Shutdown order                       (0-32767)
#       9 - Priority                             (0-127, 128)
#      10 - Command + arguments + redirection
#
# 1 2 3 4 5 6 7   8    9   10
# - - - - - - -   -    -   --
```

Table 3-2. RTAP Environment

```
  1 0 N N N N Y 32767 128  RTAP Scheduler -m 80
  0 1 N P N N N    91 128  limitLog -n 2000 RTAP_log < RTAP LogPipe
  2 1 N P N N Y    90 128  RTAPMonitor -s -d > RTAPLogPipe  2>&1
  3 0 N P N A N    85 128  RTAPEnvLookup
  0 0 N P Y A N    92 128  tail -f RTAP_log
  5 1 N E N A N    95 128  RTAPWDServer
  6 0 N P N A Y    80 128  RTAPQServer
  7 2 N E N A Y    80 128  RTAPTimeKeeper
  8 2 N E N A N    80 128  RtapEventTrig
  9 2 N E N A Y    80 128  RTAP EventConfg

# The next line starts up the database from snapshot files.
# To reconfigure the database at startup, uncomment out the line
# with "RTAPDbStartup -r" and comment out the next line.
# (Lines which begin with a '#' character are commented lines.)
 4 2 N P N A N     0 128  RTAPDbStartup
# 4 2 N P N A N     0 128  RTAPDbStartup -r

 10 0 N E N A N    70 128  RTAPMQDBM
 11 0 N E N A N    40 128  RTAPDbCfServer
  0 0 N N N A N    40 128  RTAPCheckCfI
  0 0 N P Y A N     1 128  ksh

# The following entries are not started by the RTAP process scheduler.
# In order to start a particular process, its 'Autostart phase' must be
# set to a non-zero value.  See the RTAP/Plus Integration Manual for
# more details on the Autostart phase.

  0 0 N N N Y N    80 128  RTAPXColorMngr
  0 0 N N N Y N    80 128  /usr/RTAP/etc/gettingStarted/bin/ToolsPalette

 12 0 N P N A N    60 128  RTAPForceSnap -w
  0 0 N N N A N    60 128  RTAPPrinterCnf
# 13 3 N N N A N    50 128  RTAPSpooler -n sp1 -p /dev/lp_EPSON -f print_buffer
 14 3 N P N A N    50 128  RTAPDHMngr
 15 0 N N N A N     1 128  RTAPHConfig
  0 0 N N Y A N     1 128  RTAPDHStatus
  0 0 N P Y A N     1 128  RTAPlotDisp
  0 0 N N Y A N     1 128  RTAPTPConfig
  0 3 Y N N A N    50 128  /users/WRAP1/bin/RTAP_rcv
 16 3 N N N A N    46 128  RTAPASServer -s
#  0 4 N N Y A N    45 128  RTAPASLogger -p sp1 -f alarmLog -F all
  0 4 N N Y A N    45 128  RTAPASLogger -f alarmLog -F all
  0 4 Y N N A N    50 128  /users/WRAP1/bin/netcom
 17 4 N P N A N    45 128  RTAPASAction
  0 0 N P Y A N    45 128  RTAPASDisplay
 18 0 N N N A N    40 128  RTAPCmdServer
  0 0 N N N A N     1 128  RTAPCmdSched
 19 4 Y N N A N    40 128  RTAPScanMngr
  0 0 N N Y A N     1 128  RTAP3852Init
  0 0 N N Y A N     1 128  RTAP3852Scan
  0 0 N N Y A N     1 128  RTAP48kScanner
  0 0 N N Y A N     1 128  RTAPModbusScan
  0 0 N N Y A N     1 128  RTAPDataHwyScn
  0 0 N N Y A N     1 128  RTAPH1Scan
  0 0 Y N Y A N     1 128  RTAPAbPiScan
  0 0 N N Y A N     1 128  RTAPAbKtScan
  0 0 N N Y A N     1 128  RTAPRpBuilder
  0 0 N N Y A N     1 128  RTAPRpNrocessr -s sp1
  0 0 N N Y A N     1 128  RTAPDbConfig
  0 0 N N Y A N     1 128  RTAPDbLoader
  0 0 N N Y A N     1 128  RTAPDbUnloader
  0 0 N N Y A N     1 128  RTAPPtSelector
  0 0 N N Y A N     1 128  RTAPPtDisplay
```

Table 3-2. RTAP Environment

```
  0 0 N N Y A N      1 128  RTAPGroupEdit
  0 0 N N Y A N      1 128  RTAPGroupRep
  0 0 N N Y A N      1 128  RTAPSchematX -p 5
  0 0 N N Y A E     82 128  RTAPWatchDog
  0 0 N N N A N      1 128  RTAPSktRecv
  0 0 N N N A N      1 128  RTAPSktSend
  0 0 N P Y A N     45 128  RTAPASSound
```

3.3 RTAP SECURITY

To eliminate significant rework of the RTAP database in case additional security requirements are identified later, points and associated attributes are configured with a security system in mind as the database is developed. If point categories are undefined or inadequately defined now and changes are necessary later, 2000 plus points/attributes may have to be changed. RTAP permits up to 4 distinct groups and up to 32 distinct categories to be specified. Categories are used to control access to points, and groups are used to control access to the point attributes.

GROUP DEFINITIONS:

admin	(not an RTAP group); RTAP superuser (Note: **NOT SYSTEM SUPERUSER**); logon as "RTAP". (Note: If a user logs on as user "RTAP", any existing RTAP security will be bypassed.) Access permitted to RTAP security definition files and all other RTAP functions.
development	(an RTAP group); not used. Developers are to log in as "RTAP" (see "admin" above)
supervisor	(an RTAP group); access to change setpoints; logon by individual user id. This group shall have read and write access to all point categories including ability to change alarm setpoints. Security is by individual user ID logon.
genop	(an RTAP group); access to read screens, print reports, acknowledge alarms; logon by user id. This group shall have read and write access to all point categories, as well as, write access to non-alarm setpoints and control functions as guided by procedure. Alarm acknowledgement and report printing is also allowed. Security is by group ID logon, which will be the normal logon state of the terminal during operation.
monitor	(an RTAP group); access to read screens only; logon by group user ID. This group shall have read only access to all point categories. Printing of limited reports shall be allowed. Security is by group ID logon.

CATEGORY DEFINITIONS:

Signal lists, from the 13462 construction specifications were used to determine which signals/points were to be assigned to which category. In some instances, signals/points appeared in several attachments. In those cases, multiple categories are designated in the database point file.

Table 3-3 is a Point Category Table listing the category numbers, category abbreviations, and group access privileges. Since group access privileges will initially be available to all

groups, RTAP security will be limited to granting point attribute privileges to groups. Later, if additional

security controls become necessary, the system administrator can eliminate specific point categories from user profile files, and/or configure additional user profile files.

Table 3-3. Point Category Table

Category No.	Category Description	Abbr. Name	Access Privileges
0	Network	Netw	All groups
1	Receiving	Rcvg	All groups
2	NDE/NDA Area Internal Transport	Ndit	All groups
3	Drum NDE	Dnde	All groups
4	Drum PAN	Dpan	All groups
5	Drum GEA	Dgea	All groups
6	SIE Operations	Sieo	All groups
7	Process Area Internal Transport	Pait	All groups
8	LLW Process Gloveboxes	Llwg	All groups
9	LLW Restricted Waste Management	Llwr	All groups
10	TRU Process Gloveboxes	Trug	All groups
11	TRU Restricted Waste Management	Trur	All groups
12	Sample Management	Samp	All groups
13	Box NDE	Bnde	All groups
14	Boxed Waste Assay System	Bwas	All groups
15	Shipping	Shpg	All groups
16	HVAC System	Hvac	All groups
17	Monitor Facility	Facm	All groups

EXAMPLE:

The following example illustrates how RTAP security is configured:

1. Add a Security Directory to the RTAP environment.
2. Add an RTAPDatabase file to Security Directory; list all categories and groups.
3. Add user security files (profiles) to Security Directory - one for each user; list read and write category permission(s), and user's group.

4. Add Point Configuration Files to RTAP database - one for each point; list category(s) of the point, and read and write group(s) for each attribute.

Security Directory

[File: RTAPDatabase]

Category.network:	0
Category.receiving:	1
Category.nde/nda_transport:	2
Category.drum_nde:	3
Category.drum_pan:	4
Category.drum_gea:	5
Category.sie_operations:	6
Category.process_transport:	7
Category.llw_gloveboxes:	8
Category.llwrwm:	9
Category.tru_gloveboxes:	10
Category.trurwm:	11
Category.sample_management	12
:	
Category.box_nde:	13
Category.bwas:	14
Category.shipping:	15
Category.hvac:	16
Category.monitor_facility:	17
Group.development:	0
Group.supervisor:	1
Group.genop:	2
Group.monitor:	3

[File: monitor]
RTAPDatabase.ReadCategories: network receiving nde/nda_transport drum_nde drum_pan drum_gea sie_operations process_transport llw_gloveboxes llwrwm tru_gloveboxes trurwm sample_management box_nde bwas shipping hvac monitor_facility
RTAPDatabase.WriteCategories:
RTAPDatabase.groups: monitor

RTAP database

[File: 1] (an nde1 point)
Name = examination in progress
Alias = ND06104AES
Category = 00000000000000000000000000001000 (32 bit mask, LSB is to right)

BEGIN ATTRIBUTE
Name = contact input
Read Groups: 1111 (all groups can read; 4 bit mask, LSB is to right)

Write Groups: 0100 (only development can write)
END

[File: 2] (an nde2 point)
Name = abort examination
Alias = ND06104BSP
Category = 00000000000000000000000000001000

BEGIN ATTRIBUTE
Name = contact output
Read Groups: 1111
Write Groups: 0100
END

3.4 HPUX KERNEL CONFIGURATION FOR RTAP SUPPORT

An example configuration file for the system kernel is given in Figure 3-4. For further information on the kernel refer to the HP-UX reference manuals.

Table 3-4. RTAP Startup Definitions (Example)

```
#define ACCTRESUME      4
#define ACCTSUSPEND     2
#define BOOTSPINLOCKS   64
#define BUFPAGES        0
#define CHECK_ALIVE_PERIOD      4
#define DMMAX   2048
#define DMMIN   32
#define DMSHM   2048
#define DMTEXT  2048
#define DSKLESS_FSBUFS  (SERVING_ARRAY_SIZE)
#define DSKLESS_NODE    0
#define DST     1
#define EQMEMSIZE       10
#define FILE_PAD        10
#define FS_ASYNC        0
#define IOMEMSIZE       (10 * NBPG)
#define MAXDSIZ 67108864
#define MAXSSIZ 8388608
#define MAXSWAPCHUNKS   128
#define MAXTSIZ 67108864
#define MAXUPRC 64
#define MINSWAPCHUNKS   1
#define MSGMAP  (2 + MSGTQL)
#define MSGMAX  32768
#define MSGMNB  32768
#define MSGMNI  50
#define MSGSEG  7168
#define MSGSSZ  8
#define MSGTQL  256
#define NBUF    0
#define NCALLOUT        (64 + NPROC)
#define NETISR_PRIORITY         -1
#define NETMEMMAX       0
#define NNI     2
#define NFILE   (16 * (NPROC + 16 + MAXUSERS) / 10 + 32 + 2 * NETSLOP)
#define NFLOCKS 200
#define NGCSP   (8 * NUM_CNODES)
#define NINODE  ((NPROC + 16 + MAXUSERS) +32)
#define NO_LVM_DISKS    0
#define NPROC   (20 + 8 * MAXUSERS)
#define NPTY    32
#define NSTLBE  0
#define NSWAPDEV        10
#define NSWAPFS 10
#define NTEXT   (24 + MAXUSERS + NETSLOP)
#define NUM_CNODES      ((5*SERVER_NODE) + (DSKLESS_NODE))
#define PFAIL_ENABLED   1
#define PUBLIC_SHLIBS   1
#define REBOOT_OPTION   1
#define REC_INST_KERNEL         0
#define RETRY_ALIVE_PERIOD      21
#define SCROLL_LINES    100
#define SELFTEST_PERIOD         120
#define SEMAEM  16384
#define SEMMAP  36
#define SEMMNI  36
```

Table 3-4. RTAP Startup Definitions (Example)

```
#define SEMMNS  128
#define SEMMNU  60
#define SEMUME  36
#define SEMVMX  32767
#define SERVER_NODE     1
#define SERVING_ARRAY_SIZE      (SERVER_NODE * NUM_CNODES * MAXUSERS + 2 * MAXUSERS)
#define SHMMAX  268435456
#define SHMMNI  100
#define SHMSEG  36
#define SWAPMEM_ON      1
#define SWCHUNK 2048
#define TIMESLICE       (HZ/10)
#define TIMEZONE        480
#define UNLOCKABLE_MEM 0
#define USING_ARRAY_SIZE        (NPROC)
#define MAXFILES_LIM    1024
#define MAXFILES        60
#define BX25SMAX        128
#define BX25SBUFS       256
#define BX25SBYTES      264192
#define BX25LINKS       64
#define BX25BUFS        1032
#define BX25BYTES       196608
#define BX25HLPROT      2
#define DELAYCLOSETIMER         500
#define NUM_DKHS        0
#define NSTREVENT       50
#define STRMSGSZ        4096
#define STRCTLSZ        1024
#define NSTRPUSH        16
#define IPX_MAX_SOCKETS         100
#define SPX_MAX_SOCKETS         100
#define SPX_MAX_CONNECTIONS     30
#define NVT_CONNECTIONS         60
#define NCP_MAX_ENGINES         50
#define NCP_MAX_CLIENTS         250
#define MAXVGS  10
#define MAXUSERS        16
#define NM
#define NI
#define LV
#define PDISC
#define NETDIAG1
#define MIRCONFIG
#define SY
#define SW1
#define SW
#define PTY1
#define PTY0
#define MM
#define MEAS_DRIVR
#define KLOG
#define DMEM
#define DIAG0
#define DEVCONFIG
#define CN
#define LVM
#define UIPC
#define INET
#define NIPC
#define LAN
#define UFS_INCLUDED
#define CDFS_INCLUDED
#define NFS_INCLUDED
```

Table 3-4. RTAP Startup Definitions (Example)

```
#define PROCESSOR_INCLUDED
#define MEMORY_INCLUDED
#define BUS_CONVERTER_INCLUDED
#define LANMUX0_INCLUDED
#define SCSI1_INCLUDED
#define SCSI3_INCLUDED
#define LPR2_INCLUDED
#define MUX2_INCLUDED
#define TAPE2_INCLUDED
#define DISC3_INCLUDED
#define LAN3_INCLUDED
#define TARGET_INCLUDED
#define SCC1_INCLUDED
#define LAN2_INCLUDED
#define BUS_ADAPTER_INCLUDED
#define NUM_IO_MODULES 0
#define NUM_IOTREE_RECS        1
```

3.5 RTAP ALARM LAYOUT

The alarms generated by the RTAP system will be displayed on the Operator Consoles in the control room, printed on the system alarm printer, and stored in a text file on the system. The format of the alarm messages is slightly different for the screen display and the printed and logged messages. The formats are given in the following sections.

3.5.1 Screen Alarm Layout

3.5.1.1 Events

Date and Time:	Equipment Description	TAG ID	State	Alias

for example:

95-06-23 15:35:05:	DRUM NDE A TRANSFER CONVEYOR	104-CV-09-101A	ON	P141
95-06-23 15:35:00:	DRUM NDE A TRANSFER CONVEYOR	104-CV-09-101A	MANUAL	auto manual

3.5.1.2 Alarms

Digital Alarms

Date and Time:	Equipment Description	TAG ID	Condition	Response Procedure	Alias

for example:

95-06-23 15:35:05:	LLW ENTRY	LT-202A	LIFT TABLE FAILED TO LOWER	123456	P835330581
95-06-23 15:35:00:	NDE/NDA BUFFER STORAGE CAROUSEL	104-CV-09-102	DRUM TRANSFER FAILURE	123456	CV-09-102TF

Analog Alarms

Date and Time:	Equipment Description	Condition	Response Procedure	Alias

for example:

95-06-23 15:35:05:	COMPUTER CONTROL ROOM TEMPERA...	High	analog	11-TI-632A

3.5.2 Data Management System Alarms

There are two classes of Data Management System (DMS) alarms. One alarm is the DMS Status alarm sent via NETCOM message 5.4.12. This is the 'keep alive' status poll sent every minute from the PCS. The normal DMS response, if it is functioning properly, should be a status of 00000000 with an error code of 1000. When the DMS receives a 5.3.22 message, it checks the status of all open sockets, including Oracle, and reports the status back to the PCS via message 5.4.12. RTAP displays the equipment statuses on the NETWORK OVERVIEW screen, accessible from the OVERVIEW screen.

The second DMS message is the 5.4.18 message. This message is used to convey alarms, warnings, and events to RTAP, separately from the status message. Alarm levels are sent by use of Equipment Status Value field, according to Table 8-5. There are 9 RTAP points defined to contain the DMS alarms. These are located below the dms node and are labeled dms alarms 1, dms alarms 2, dms alarms 9. NETCOM cycles through each of these 9 points sequentially so that each alarm can be serviced before it is overwritten. Each alarm point is self clearing, such that after 10 seconds the alarm Equipment Status Value is reset to 0.

3.5.3 Logged Alarm Layout (Printed and Stored)

The logged information for both event and alarms is the same as shown above except a leader is added to each line that gives the alias of the point which triggered the alarm, the name of the attribute that the alarm instance is in, and the label for the alarm.

3.6 RTAP DATA LOGGING

3.6.1 Alarm Printer Initialization

When the PCS server is booting, it downloads the printer setup to the Epson printer, primarily to change the default number of columns (characters per line) to 233. It does this during boot by running file /etc/rc. Within that file is a localrc() section that contains the line

/usr/bin/slp -c233 -i0 > /dev/lp_EPSON &

which initializes the printer.

If printer needs to be initialized during the day (power goes off, etc.) then do the following:

1. Stop tail of alarm log. You cannot reinitialize if tail is on.

2. Type in command above. You may have to be logged in as root to do it.

3. Re-tail alarm log as above.

3.6.2 Trending

RTAP comes standard with a real-time trending system. The system is implemented using points in the database that are defined as history points. These points contain a table that stores the data samples being collected. The trend display package references the history points and trends the data graphically. The history tables are defined to be circular so the most recent n samples, where n is the table size, are kept. As new data is collected the old data is lost when the table fills. Every value that is being trended in the database has its own history point (for a complete list of all data values being trended please refer to the O&M Manuals). The points are set to trigger (i.e. sample the data value) every time the value changes or once an hour, whichever occurs first. The tables are currently defined to a size of 250 samples. The tables are circular so once the 250 sample limit has been reached, the oldest samples get overwritten with the new ones. Table 3-5 shows an example of configured history points for the WRAP system.

Table 3-5. History Points (Example)

Parent		History	
Point Name	Point Alias	Point Alias	PLIN
11-PDIT-601	11-PDIT-601	11-PDIT-601 hist	385
11-PDIT-602	11-PDIT-602	11-PDIT-602 hist	387
11-PDIT-603	11-PDIT-603	11-PDIT-603 hist	389
11-PDIT-606	11-PDIT-606	11-PDIT-606 hist	391
11-PDIT-607	11-PDIT-607	11-PDIT-607 hist	393
alpha cam flow	12-FT-551	alpha cam flow hist	200
beta cam flow	12-FT-552	beta cam flow hist	208
12-RIT-517A	12-RIT-517A	Critical A history	45
12-RIT-517B	12-RIT-517B	Critical B history	49
12-RIT-517C	12-RIT-517C	Critical C hist	54
exhaust flow	11-FI-617A	Filter a ex hist	285
inlet	11-PDI-611A	Filter a inlet hist	291
alpha cam	12-RIT-551	isem alpha cam hist	197
beta cam	12-RIT-552	isem beta hist	205
temperature	12-TT-553	isem temp hist	217
diff pressure	11-PDI-317	llw dp hist	308
flow	11-FI-316	llw flow hist	310
12-RITA-503	12-RITA-503	llw proc beta hist	69
12-RITA-501	12-RITA-501	Llwrwm beta history	59
diff pressure	11-PDI-392	Llwrwm dp hist	313
flow	11-FI-391	Llwrwm flow hist	315
12-RITA-510	12-RITA-510	nde nda alpha hist	84
12-RITA-514	12-RITA-514	nde nda beta hist	104
outside temp	11-TI-601A	Outside temp hist	400
12-RIT-506	12-RIT-506	P509	31
supply temperature	11-TI-605A	P526	406
exhaust flow	11-FI-618A	P574	360
exhaust temp	11-TI-618A	P577	363
supply temperature	11-TI-626	P584	441
mixed temperature	11-TI-621	P586	434
Facility currie	facility currie	P605	220
supply temperature	11-TI-637A	P606	257
mixed temperature	11-TI-635A	P608	254
mixed temperature	11-TI-642	P617	229
supply temperature	11-TI-645	P618	238
outside temperature	11-TI-641	P620	231
supply flow	11-FI-643	P622	243
return flow	11-FI-642	P624	241
supply pressure	11-PDI-645	P626	245
supply temperature	11-TI-665	P636	349
Flow	11-FI-652	P641	338
Temperature	11-TI-652	P643	340
tru fissile	tru fissile	P664	1227
trurwm fissile	trurwm fissile	P667	1230
nde nda temperature	11-TI-627	P685	444
Temperature a	11-TI-632A	P694	276
Temperature b	11-TI-632B	P697	279
Humidity a	11-MI-632A	P701	269
Humidity b	11-MI-632B	P704	272
room temperature	11-TI-668	P713	353
exhaust flow	11-FI-617B	P734	297
Inlet	11-PDI-611B	P735	303
outside temp	11-TI-601B	P905	413
supply flow	11-FI-603B	P906	416
supply temperature	11-TI-605B	P907	419
exhaust flow	11-FI-618B	P920	372
exhaust temp	11-TI-618B	P921	375
process temp b	11-TI-609B	P924	424
mixed temperature	11-TI-635B	P933	264
supply temperature	11-TI-637B	P934	267

Table 3-5. History Points (Example)

12-RIT-505	12-RIT-505	proc gamma hist	26
12-RITA-512	12-RITA-512	proc hvac alpha hst	94
12-RITA-516	12-RITA-516	proc hvac beta hist	114
12-RITA-545	12-RITA-545	proc N alpha hist	124
12-RIT-508	12-RIT-508	proc N gamma hist	41
12-RITA-509	12-RITA-509	Process alpha hist	79
12-RITA-513	12-RITA-513	Process N beta hist	99
12-RITA-544	12-RITA-544	Process S beta hist	119
process temp a	11-TI-609A	Process temp a hist	421
record sampler flow	12-FT-550	Sampler flow hist	211
12-RIT-507	12-RIT-507	ship N gamma hist	36
12-RITA-511	12-RITA-511	ship rec alpha hist	89
12-RITA-515	12-RITA-515	ship rec beta hist	109
stack flow	12-FT-553	stack flow hist	214
supply flow	11-FI-603A	Supply flow hist	403
12-RITA-504	12-RITA-504	tru alpha hist	74
diff pressure	11-PDI-315	tru dp hist	319
Flow	11-FI-314	tru flow hist	321
12-RITA-502	12-RITA-502	Trurwm alpha hist	64
diff pressure	11-PDI-372	Trurwm dp hist	324
Flow	11-FI-371	Trurwm flow hist	326

3.6.3 Alarm and Event Logs

All alarms and events are written to a text file located in the WRAP environment root directory (/users/WRAP1/rtap_env) and is called *alarmLog*. These files are opened on startup of the system and grow without bound. A cron task is run every Friday at midnight to copy the last week's alarm log into a file named

alarmLog.mmddyy

where mm is the month
dd is the day of the month
yy is the year

which is also compressed. The WRAP system administrator is responsible for periodically archiving these compressed files so they do not fill up the disk.

The name of the script is alarmLogMgmt (also located in /users/WRAP1/rtap_env).

3.6.3.1 **Starting the Alarm Printout.** The alarms are printed out on an alarm printer in the computer room. This printout is just a tail of the alarmLog file. The following process can be used for killing and restarting the alarm tail to the printer.

1. Kill the process that is tailing "tail -f alarmLog" while logged on as the user that started it (usually RTAP).

2. Restart tail by entering "nohup tail -f alarmLog > /dev/lp_EPSON &" from the root directory.

3.6.4 Schematics Button Descriptions

The following tables describe the RTAP buttons associated with WRAP work areas.

3.6.4.1 Shipping/Receiving Area

Table 3-6. Shipping and Receiving RTAP Buttons

RTAP Button	RTAP Screen Description	Inputs	Outputs
Empty Infeed TRANSFER FAIL RESET	Transfer Fail Reset button is used for resetting empty infeed bits when there is a transfer fail to/from AGV.	None	Button writes a 1 to N133:111 on PLC 101.
Empty Infeed INIT. CONVEYOR	Initializes all data on PLC for empty infeed. Clears all drum presence bits, transfer fail bits, data tables, etc.	N22:1 on PLC 101 is set to 1 when data is reset to provide feedback to user.	N22:0 is set to 1 on PLC 101.
Empty Infeed REQUEST AGV PU	Sets a bit to trigger PCS to issue NETCOM 5.5.3 to AGVCS for pickup at empty infeed drop off at airlock.	None	N181:110 is set to 1 on PLC 101.
Drum Scale A DISABLE AGV PICKUPS			N140:0 is set to 1 to tr
Drum Scale A TRANSFER FAIL RESET	Sets a bit to trigger reset of all the transfer fail bits on PLC 101 for scale A.	None	N140:1 is set to 1 on PLC 101.
AS/RS popup button for INIT. INSP.	Initializes the PLC to retrieve drums from ASRS using the RTV INSP bar code at pallet stand. It takes a snapshot of the current ASRS database and sets a bit.	Button light is N12:3\3	Initialization is started by setting bit N120:30\1 to 1.
AS/RS popup button for RETRIEVE DRUM	Used to notify PLC that a single drum is to be retrieved using RTV INSP bar code		Drum PIN is stored in N120:31 – 38. Bit to signal a single drum retrieve is N120:30/0.

3.6.4.2 NDE/NDA Area

Table 3-7. NDE/NDA RTAP Buttons

RTAP Button	RTAP Screen Description	Inputs	Outputs
Background Conveyor A TRANSFER FAIL RESET	Transfer Fail Reset button is used for resetting bits when there is a transfer fail to/from AGV.	None	Button writes a 1 to N170:0 on PLC 101.
Background	Transfer Fail Reset button is used	None	Button writes a 1 to N170:1

Table 3-7. NDE/NDA RTAP Buttons

Conveyor B TRANSFER FAIL RESET	for resetting bits when there is a transfer fail to/from AGV.		on PLC 101

3.7 REFERENCES

1 Numerous manuals are available to support RTAP operation. A partial list is provided below. Please contact the manufacturer for a comprehensive list.

Hewlett Packard part number 72323-92220, October 1993, "RTAP/Plus User's Guide," Hewlett Packard, Canada.

Hewlett Packard Part Number 72323-92210, October 1993, "RTAP Integration," Hewlett Packard, Canada.

Hewlett Packard Part Number 72323-92230, October 1993, "RTAP Reference," Volume 1, Hewlett Packard, Canada.

Hewlett Packard Part Number 72323-92240, October 1993, "RTAP Reference," Volume 2, Hewlett Packard, Canada.

Hewlett Packard Part Number 72323-92240, October 1993, "RTAP Reference," Volume 2, Hewlett Packard, Canada.

Hewlett Packard Part Number 72323-92240, October 1993, "RTAP Reference," Volume 2, Hewlett Packard, Canada.

Table of Contents

List of Tables

4.0 ALARMS

{{Text to introduce the section and the following table}}

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
101-CV-05-101A	05-XS-106A/B	Drum infeed conveyor A rope switch pulled	Drum infeed conveyor A rope switch pulled Indicates that the emergency stop rope switch has been pulled and must be reset. The alarm should clear when the rope switch is reset and the conveyor can then be restarted using the start push button (05-HS-106B/ST).	Red
NETCOM 5.4.17		Facility Curie Limit Violation	After the Container Location Update message is sent for the Receiving Dock, the DMS will check the incoming drums against the Facility Curie Limit. If the Facility Curie Limit is exceeded, the DMS will not issue a Container Location Update message (NetCom message 5.4.1) and will issue a Facility Curie Level message (NetCom message 5.4.17) with a "T" in the Alarm Existing field to activate the Facility Curie Limit Violation alarm. The drums scanned will not be added to the Received Drums PIN Table. The receive operation will have to be restarted with the offending drums removed from the process.	Red
101-CV-05-103A/B	05-XS-107A/B	Drum scale conveyor A rope switch pulled	Drum scale conveyor A rope switch pulled indicates that the emergency stop rope switch has been pulled and must be reset. The alarm should clear when the rope switch is reset and the conveyor can then be restarted using the start push button (05-HS-106B/ST).	Red
101-CV-05-108A/B	05-XS-110A/B	Drum scale conveyor B rope switch pulled	Drum scale conveyor B rope switch pulled indicates that the emergency stop rope switch has been pulled and must be reset. Once the rope has been reset the operator must press the stop push button (05-HS-106B/SP) to reset the system. The alarm should clear and the conveyor can then be restarted using the start push button (05-HS-106B/ST).	Red
101-CV-05-102	05-XS-109A/B	Drum Discharge Conveyor Rope Switch Pulled	Emergency Stop indicates that the signal from rope switches 05-XS-109A or 05-XS-109B has been lost. The operator should reset the rope switches.	Red
101-CV-05-103B	05-XS-110A/B	Drum scale conveyor B rope switch pulled	Drum Scale Conveyor B Rope Switch Pulled indicates that the emergency stop rope switch has been pulled and must be reset. The alarm should clear when the rope switch is reset and the conveyor can then be restarted using the start push button (05-HS-106B/ST).	Red
101-CV-05-117A/B	05-XS-117A/B	Empty Drum Infeed Rope Switch Pulled	Emergency Stop indicates that the signal from rope switches 05-XS-117A or 05-XS-117B has been lost. The operator should reset the rope switches.	Red
TE-12-104	07-HS-305	TRU Glovebox Suite Emergency Stop		Red

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
TE-12-103	07-HS-315	LLW Glovebox Suite Emergency Stop		Red
107-CV-09-201A	09-XS-215A/B	Process Airlock Conveyor A Rope Switch Pulled	Indicates that the rope switch has been pulled and needs to be reset	Red
107-CV-09-201B	09-XS-216A/B	Rope Switch Pulled Airlock Transfer Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-103A	09-XS-211A/B	Rope Switch Pulled Airlock Transfer Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-103B	09-XS-212A/B	Rope Switch Pulled Airlock Transfer Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red
105-CV-09-104A	09-XS-213A/B	Rope Switch Pulled Airlock Transfer Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red
105-CV-09-104B	09-XS-214A/B	Rope Switch Pulled Airlock Transfer Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-201A	09-XS-221A/B	Rope Switch Pulled TRU RWM Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-201B	09-XS-223A/B	Rope Switch Pulled TRU RWM Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-201C	09-XS-225A/B	Rope Switch Pulled TRU RWM Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-201D	09-XS-227A/B	Rope Switch Pulled TRU RWM Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-201E	09-XS-229A/B	Rope Switch Pulled TRU RWM Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-201F	09-XS-231A/B	Rope Switch Pulled TRU RWM Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-202A	09-XS-233A/B	Rope Switch Pulled LLW Entry Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-202B	09-XS-235A/B	Rope Switch Pulled TRU Entry Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-202C	09-XS-237A/B	Rope Switch Pulled LLW Exit Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-202D	09-XS-239A/B	Rope Switch Pulled TRU LD01 Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
107-CV-09-203	09-XS-222A/B	Rope Switch Pulled 85 Gal Empty Staging Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
107-CV-09-204	09-XS-224A/B	Rope Switch Pulled 55 Gal Empty Staging Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-203A	09-XS-241A/B	Rope Switch Pulled LLW RWM Transfer Port	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-203B	09-XS-243A/B	Rope Switch Pulled TRU RWM Transfer Port	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-203C	09-XS-245A/B	Rope Switch Pulled TRU Empty Loadout Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
LT-202E	09-XS-247A/B	Stop Rope Switch Pulled TRU Exit Lift Table	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-101A	09-XS-201A/B	Emergency Stop Rope Switch Pulled NDE_A	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-101B	09-XS-202A/B	Emergency Stop Rope Switch Pulled NDE_B	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-101C	09-XS-203A/B	Emergency Stop Rope Switch Pulled PAN_A	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-101D	09-XS-204A/B	Emergency Stop Rope Switch Pulled PAN_B	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-101E	09-XS-205A/B	Emergency Stop Rope Switch Pulled GEA_A	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-101F	09-XS-207A/B	Emergency Stop Rope Switch Pulled GEA_B	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-105A	09-XS-208A/B	Rope Switch Pulled Background Conveyor A	Indicates that the rope switch has been pulled and needs to be reset	Red
104-CV-09-105B	09-XS-210A/B	Rope Switch Pulled Background Conveyor B	Indicates that the rope switch has been pulled and needs to be reset	Red
104-ND-06-105	09-XS-219A/B	Rope Switch Pulled Box NDE Transfer Conveyor	Indicates that the rope switch has been pulled and needs to be reset	Red
107-GB-07-101	07-PSL-700	LLW Entry XFER Port DO-07-102 Loss of Pressure		Yellow
107-GB-07-301	07-PSL-800/A	TRU Entry XFER Port DO-07-302 Loss of Pressure		Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
104-ND-06-104A	**Nde a fault abort**	Equipment Fault; Examination Aborted - NDE_A	Equipment Fault; Examination Aborted - NDE A indicates that the NDE A examination has been aborted. This could be caused by an internal problem with the vault, as a result of the "Abort Exam" pushbutton on the operator console, as a result of the "Abort Exam" pushbutton on the RTAP display, or as a result of either the Fissile Inventory Level alarm or the Criticality Alert being received from the DMS. The operator should check the vault hardware and software.	Red
104-ND-06-104B	**nde b fault abort**	Equipment Fault; Examination Aborted - NDE_B	Equipment Fault; Examination Aborted - NDE B indicates that the NDE B examination has been aborted. This could be caused by an internal problem with the vault, as a result of the "Abort Exam" pushbutton on the operator console, as a result of the "Abort Exam" pushbutton on the RTAP display, or as a result of either the Fissile Inventory Level alarm or the Criticality Alert being received from the DMS. The operator should check the vault hardware and software.	Red
104-ND-06-105	box nde fault abort	Equipment fault; examination aborted box NDE	Equipment Fault; Examination Aborted Indicates that Box NDE examination has been aborted. This could be as a result of an internal problem with the vault, as a result of the "Abort Exam" pushbutton on the operator console, as a result of the "Abort Exam" pushbutton on the RTAP display, or by the receipt of a Fissile Inventory Level alarm or a Criticality Alert from the DMS.	Red
104-ND-06-106	bwas fault abort	Equipment fault; examination aborted BWAS		Red
	11-ZSC-608	Zone II Exhaust Fire Damper Closed, Zone II Ventilation Shutdown	Zone II Exhaust Fire Damper Closed, Zone II Ventilation Shutdown indicates that the zone II exhaust fire damper is closed and that the ventilation for zone II is shutdown.	Red
	13-XA-581A	Fire Protection System Fire Alarm	Fire Protection System Fire Alarm indicates that there is a fire alarm in the facility.	Red
	11-TI-632A	Control Room High Temperature	Control Room High Temperature indicates that the control room temperature is too high.	Red
	11-TI-632B	Control Room High Temperature	Control Room High Temperature indicates that the control room temperature is too high.	Red
203-AH-11-101	11-PDISH-622	Shipping/Receiving & NDE/NDA Final Filter High Diff Press	Shipping/Receiving & NDE/NDA Final Filter High Diff Press indicates that the differential pressure across the shipping/receiving & NDE/NDA final filter is too high. Probably due to a dirty filter.	Yellow
SF-11-101	11-PDISL-623	Shipping/Receiving & NDE/NDA Supply Fan Failed	Shipping/Receiving & NDE/NDA Supply Fan Failed indicates that the shipping/receiving & NDE/NDA supply fan has failed.	Red
203-AH-11-401	11-PDISH-642	Administration area AHU Differential Pressure High	Administration Area AHU Final Filter High Diff Press indicates that the differential pressure across the administration area AHU final filter is too high.. Probably due to a dirty filter.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
RF-11-401	11-PDISL-644	Administration Area Return Fan Failed	Administration Area Return Fan Failed indicates that the administration area return fan has failed.	Red
SF-11-401	11-PDISL-643	Administration Area Supply Fan Failed	Administration Area Supply Fan Failed indicates that the administration area supply fan has failed.	Red
203-AH-11-301	11-PDISH-661	Locker Room AHU Pre-Filter High Diff Press	Locker Room AHU Pre-Filter High Diff Press indicates that the differential pressure across the locker room AHU pre-filter is too high.	Yellow
203-AH-11-301	11-PDISH-662	Locker Room AHU Final Filter High Diff Press	Locker Room AHU Final Filter High Diff Press indicates that the differential pressure across the locker room AHU final filter is too high.	Yellow
113-FT-11-202A	11-PDISH-614A	Process Exhaust A First HEPA Filter High Diff Press	Process Exhaust A First HEPA Filter High Diff Press indicates that the differential pressure across the process exhaust A first HEPA filter is too high.	Red
113-FT-11-202B	11-PDISH-614B	Process Exhaust B First HEPA Filter High Diff Press	Process Exhaust B First HEPA Filter High Diff Press indicates that the differential pressure across the process exhaust B first HEPA filter is too high.	Red
113-FT-11-202A	11-PDISH-616A	Process Exhaust A Second HEPA Filter High Differential Pressure	Process Exhaust B Second HEPA Filter High Diff Press indicates that the differential pressure across the process A second HEPA filter is too high.	Red
113-FT-11-202B	11-PDISH-616B	Process Exhaust B Second HEPA Filter High Differential Pressure	Process Exhaust B Second HEPA Filter High Diff Press indicates that the differential pressure across the process B second HEPA filter is too high.	Red
	11-FI-316	LLW Glovebox High Airflow	Indicates that the airflow through the glovebox is too high.	Red
	11-FI-316	LLW Glovebox Low Airflow	Indicates that the airflow through the glovebox is too low..	Red
	11-FI-314	TRU Glovebox High Airflow	Indicates that the airflow through the glovebox is too high.	Red
	11-FI-314	TRU Glovebox Low Airflow	Indicates that the airflow through the glovebox is too low.	Red
	11-FI-371	TRU Restricted Waste Glovebox High Airflow	Indicates that the airflow through the glovebox is too high.	Red
	11-FI-371	TRU Restricted Waste Glovebox Low Airflow	Indicates that the airflow through the glovebox is too low.	Red
	11-FI-391	LLW Restricted Waste Glovebox High Airflow	Indicates that the airflow through the glovebox is too high.	Red
	11-FI-391	LLW Restricted Waste Glovebox Low Airflow	Indicates that the airflow through the glovebox is too low.	Red

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	11-PDI-611A	Glovebox Exhaust Filter Train A High Diff Press	Glovebox Exhaust Filter Train A High Diff Press indicates that the differential pressure across the glovebox exhaust filter train A is too high.	Red
	11-PDI-611A	Glovebox Exhaust Filter Train A Low Diff Press	Glovebox Exhaust Filter Train A Low Diff Press indicates that the differential pressure across the glovebox exhaust filter train A is too low.	Red
	11-PDI-611B	Glovebox Exhaust Filter Train B High Diff Press	Glovebox Exhaust Filter Train B High Diff Press indicates that the differential pressure across the glovebox exhaust filter train B is too high.	Red
	11-PDI-611B	Glovebox Exhaust Filter Train B Low Diff Press	Glovebox Exhaust Filter Train B Low Diff Press indicates that the differential pressure across the glovebox exhaust filter train B is too low.	Red
113-FT-11-201A	11-PDISH-613A	Glovebox Exhaust A First HEPA Filter High Differential Pressure	Glovebox Exhaust A First HEPA Filter High Diff Press indicates that the differential pressure across the glovebox exhaust A first HEPA filter is too high.	Red
113-FT-11-201B	11-PDISH-613B	Glovebox Exhaust B First HEPA Filter High Differential Pressure	Glovebox Exhaust B First HEPA Filter High Diff Press indicates that the differential pressure across the glovebox exhaust B first HEPA filter is too high.	Red
113-FT-11-201A	11-PDISH-615A	Glovebox Exhaust A Second HEPA Filter High Differential Pressure	Glovebox Exhaust A Second HEPA Filter High Diff Press indicates that the differential pressure across the glovebox exhaust second A second HEPA filter is too high.	Red
113-FT-11-201B	11-PDISH-615B	Glovebox Exhaust B Second HEPA Filter High Differential Pressure	Glovebox Exhaust B Second HEPA Filter High Diff Press indicates that the differential pressure across the glovebox exhaust second B second HEPA filter is too high.	Red
	11-PDI-315	TRU Glovebox High Differential Pressure	Indicates that the differential pressure through the glovebox is too high.	Red
	11-PDI-315	TRU Glovebox Low Differential Pressure	Indicates that the differential pressure through the glovebox is too low.	Red
	11-PDI-317	LLW Glovebox High Differential Pressure	Indicates that the differential pressure through the glovebox is too high.	Red
	11-PDI-317	LLW Glovebox Low Differential Pressure	Indicates that the differential pressure through the glovebox is too low.	Red
	11-PDI-372	TRU Restricted Waste Glovebox High Diff Press	Indicates that the differential pressure through the glovebox is too high.	Red
	11-PDI-372	TRU Restricted Waste Glovebox Low Diff Press	Indicates that the differential pressure through the glovebox is too low.	Red
	11-PDI-392	LLW Restricted Waste Glovebox High Diff Press	Indicates that the differential pressure through the glovebox is too high.	Red
	11-PDI-392	LLW Restricted Waste Glovebox Low Diff Press	Indicates that the differential pressure through the glovebox is too low.	Red

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
107-GB-07-301	07-PDISL-303/A	TRU Glovebox Low Differential Pressure	Indicates that the differential pressure through the glovebox is too low.	Red
107-GB-07-309	07-PDISL-309/A	TRU Waste Loadout 1 Glovebox Low differential pressure	Indicates that the differential pressure through the glovebox is too low.	Red
107-GB-07-302	07-PDISL-318/A	TRU Sort Low Glovebox Differential Pressure	Indicates that the differential pressure through the glovebox is too low.	Red
	Network lcu 101	Communications with LCU 101 Down	Communications Down indicates that the network communications link to the device is not functioning. The operator should verify that Netcom is running and check all network connections.	
	Network lcu 102	Communications with LCU 102 Down	Communications Down indicates that the network communications link to the device is not functioning. The operator should verify that Netcom is running and check all network connections.	
	Network lcu 103	Communications with LCU 103 Down	Communications Down indicates that the network communications link to the device is not functioning. The operator should verify that Netcom is running and check all network connections.	
	Network lcu 104	Communications with LCU 104 Down	Communications Down indicates that the network communications link to the device is not functioning. The operator should verify that Netcom is running and check all network connections.	
	Network agv	Communications with AGVCS Down	Communications Down indicates that the network communications link to the device is not functioning. The operator should verify that Netcom is running and check all network connections.	
	Network asrs	Communications with AS/RS Down	Communications Down indicates that the network communications link to the device is not functioning. The operator should verify that Netcom is running and check all network connections.	
	Network pam	Communications with PAM Down	Communications Down indicates that the network communications link to the device is not functioning. The operator should verify that Netcom is running and check all network connections.	
101-CV-05-101A	CV-05-101A	Drum Infeed conveyor A failed	Drum infeed conveyor A failed indicates that there is a problem with the drum infeed conveyor that must be remedied at the conveyor. The operator should inspect the conveyor for hardware problems or obstructions.	Yellow
101-CV-05-101B	CV-05-101B/A	Drum Scale Conveyor B Failed	Drum Infeed Conveyor B Failed indicates that there is a problem with the Drum Infeed Conveyor B. The operator should inspect the conveyor for hardware problems or obstructions.	Yellow
101-CV-05-103A	CV-05-103B	Drum scale conveyor A failed	Drum scale conveyor A failed indicates that there is a problem with the drum scale conveyor that must be remedied at the conveyor.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
101-CV-05-103B	CV-05-103B	Drum scale conveyor B failed	Drum scale conveyor B failed indicates that there is a problem with the drum infeed conveyor that must be remedied at the conveyor.	Yellow
101-CV-05-102	CV-05-102/A	Drum Discharge Conveyor Failed	Drum Discharge Conveyor Failed indicates that there is a problem with the Drum Discharge Conveyor. The operator should inspect the conveyor for hardware problems or obstructions.	Yellow
101-CV-05-105	CV-05-105/A	Empty Drum Infeed Conveyor Failed	Empty Drum Infeed Conveyor Failed indicates that there is a problem at the Empty Drum Infeed Conveyor. The operator should inspect the conveyor for hardware problems or obstructions.	Yellow
101-CV-05-103A	05-WE-107-A/B	Drum scale conveyor A drum weight out-of-bounds	Drum scale conveyor A drum weight out-of-bounds indicates that the drum weight exceeds either the upper or lower weight limits. Alarm is cleared after a time delay. Alarm does not prevent operations from continuing.	Yellow
101-CV-05-101B	CV-05-101BTF/A	Drum Scale Conveyor B Drum Transfer Failure	Drum Infeed Conveyor B Drum Transfer Failure indicates that the drum transfer to the AGV did not complete successfully. The alarm clears after a time delay.	Yellow
101-CV-05-103B	05-WE-107ABB/A	Drum scale conveyor B drum weight out-of-bounds	Drum scale conveyor B drum weight out-of-bounds indicates that the drum weight exceeds either the upper or lower weight limits. Alarm is cleared after a time delay. Alarm does not prevent operations from continuing.	Yellow
	Scale b pin mismatch	Drum scale conveyor B drum PIN mismatch	Drum scale conveyor B drum PIN mismatch indicates that the drum PIN scanned at the scale conveyor B did not match the drum PIN that was tracked to the scale conveyor. The alarm is cleared after a time delay. Activation of this alarm prevents any further operations at the drum scale conveyor from continuing until the alarm is cleared.	Yellow
	Scalea pin mismatch	Drum scale conveyor A drum PIN mismatch	Drum scale conveyor A drum PIN mismatch indicates that the drum PIN scanned was not found in either the Infeed Staging area drum data table or the Received Drums table. The alarm is cleared when a drum PIN that does exist in either table is scanned.	Yellow
104-CV-09-105A	CV-09-105ATF/A	Drum Transfer Failure - Background Conveyor A	Failed To Transfer Drum indicates that the AGV Background Conveyor A does not sense drum presence after a transfer to Background Conveyor A [AGV] is initiated plus a time delay. The operator should check conveyor and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	Yellow
104-CV-09-105B	CV-09-105BTF/A	Drum Transfer Failure - Background Conveyor B	Failed To Transfer Drum indicates that the AGV Background Conveyor B does not sense drum presence after a transfer to Background Conveyor B [AGV] is initiated plus a time delay. The operator should check conveyor and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
101-CV-05-105	CV-05-105TF/A	Empty Drum Infeed Conveyor Drum Transfer Failed	Empty Drum Infeed Conveyor Drum Transfer Failed indicates that the AGV does not sense drum presence after a transfer from the Empty Drum Infeed Conveyor is initiated plus a time delay. The operator should check conveyor and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	Yellow
101-CV-05-105	Empin9 pin mismatch	Empty Drum Infeed Conveyor Drum PIN Mismatch - Crane End	Empty Drum Infeed Conveyor Drum PIN Mismatch - Crane End indicates that the PIN of the drum just placed at the crane-end of the conveyor was not found in the Empty Drum Storage drum PIN table. The operator should verify that the drum was previously stored in the Empty Drum Storage area. This alarm clears when the operator cancels the bar code operation.	Yellow
101-CV-05-105	Empin1 pin mismatch	Empty Drum Infeed Conveyor Drum PIN Mismatch - AGV End	Empty Drum Infeed Conveyor Drum PIN Mismatch - AGV End indicates that the PIN of the drum just placed at the AGV-end of the conveyor was not found in the Empty Drum Storage drum PIN table. The operator should verify that the drum was previously stored in the Empty Drum Storage area. This alarm clears when the operator cancels the bar code operation.	Yellow
101-CV-05-105	Empty in bad route	Empty Drum Infeed Conveyor AGV Pick-up Bad or Missing Route	Empty Drum Infeed Conveyor AGV Pick-up Bad or Missing Route indicates that the drum in the "Ready" position of the Empty Infeed Conveyor has an invalid process route when the operator requested an AGV pickup.. This alarm clears after a time delay.	Yellow
101-CV-05-105	Empin rt mismatch	Empty Drum Infeed Conveyor EDPR Drum PIN Not Found	Empty Drum Infeed Conveyor EDPR Drum PIN Not Found indicates that the drum PIN contained in the Empty Drum Process Route message sent from the DMS was not found in the Empty Drum Infeed Conveyor drum PIN table. The operator should verify that the drum does not exist on the conveyor and correct the problem in the PCS or the DMS. This alarm clears after a time-delay.	Yellow
101-CV-05-102	CV-05-102TF/A	Drum Discharge Conveyor Drum Transfer Failed	Drum Discharge Conveyor Drum Transfer Failed indicates that the PCS does not sense drum presence on the Drum Discharge conveyor after a transfer from the AGV is initiated plus a time delay. The operator should check conveyor and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	Yellow
104-CV-09-103A	CV-09-103ATF/A	Failed To Transfer Drum - Airlock Transfer Conveyor 103A	Failed To Transfer Drum indicates that the AGV side drum position switch does not/continue to sense drum in position after transfer from/to AGV is initiated plus a time delay (reverse/forward system operation).	Yellow
104-CV-09-103A	CV-09-103ATP/A	Failed To Transport Drum - Airlock Transfer Conveyor 103A	Failed To Transport Drum indicates that the airlock/AGV side drum position switch does not detect drum presence X seconds after conveyor run reverse/forward is initiated with drum indicated in starting position by AGV/airlock side drum position switch (reverse/forward system operation).	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
104-CV-09-103B	CV-09-103BTF/A	Failed To Transfer Drum - Airlock Transfer Conveyor 103B	Failed To Transfer Drum indicates that the AGV side drum position switch does not/continue to sense drum in position after transfer from/to AGV is initiated plus a time delay (reverse/forward system operation).	Yellow
104-CV-09-103B	CV-09-103BTP/A	Failed To Transport Drum - Airlock Transfer Conveyor 103B	Failed To Transport Drum indicates that the airlock/AGV side drum position switch does not detect drum presence X seconds after conveyor run reverse/forward is initiated with drum indicated in starting position by AGV/airlock side drum position switch (reverse/forward system operation).	Yellow
105-CV-09-104A	CV-09-104ATP/A	Failed To Transport Drum - Airlock Transfer Conveyor 104A	Failed To Transport Drum indicates that the airlock/AGV side drum position switch does not detect drum presence X seconds after conveyor run reverse/forward is initiated with drum indicated in starting position by AGV/airlock side drum position switch (reverse/forward system operation).	Yellow
105-CV-09-104B	CV-09-104BTP/A	Failed To Transport Drum - Airlock Transfer Conveyor 104B	Failed To Transport Drum indicates that the airlock/AGV side drum position switch does not detect drum presence X seconds after conveyor run reverse/forward is initiated with drum indicated in starting position by AGV/airlock side drum position switch (reverse/forward system operation).	Yellow
107-CV-09-201A	CV-09-201ATF/A	Failed To Transfer Drum - Airlock Transfer Conveyor 201A	Failed To Transfer Drum indicates that the AGV side drum position switch does not/continue to sense drum in position after transfer from/to AGV is initiated plus a time delay (reverse/forward system operation).	Yellow
107-CV-09-201A	CV-09-201ATP/A	Failed To Transport Drum - Airlock Transfer Conveyor 201A	Failed To Transport Drum indicates that the airlock/AGV side drum position switch does not detect drum presence X seconds after conveyor run reverse/forward is initiated with drum indicated in starting position by AGV/airlock side drum position switch (reverse/forward system operation).	Yellow
107-CV-09-201B	CV-09-201BTF/A	Failed To Transfer Drum - Airlock Transfer Conveyor 201B	Failed To Transfer Drum indicates that the AGV side drum position switch does not/continue to sense drum in position after transfer from/to AGV is initiated plus a time delay (reverse/forward system operation).	Yellow
107-CV-09-201B	CV-09-201BTP/A	Failed To Transport Drum - Airlock Transfer Conveyor 201B	Failed To Transport Drum indicates that the airlock/AGV side drum position switch does not detect drum presence X seconds after conveyor run reverse/forward is initiated with drum indicated in starting position by AGV/airlock side drum position switch (reverse/forward system operation).	Yellow
104-CV-09-101A	ND-06-101ATF/A	Transfer Failure – NDE_A	Transfer Failure indicates that the AGV does not sense drum presence after a transfer to NDE_A is initiated plus a time delay. The operator should check the NDE and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	
104-CV-09-101B	ND-06-101BTF/A	Transfer Failure – NDE_B	Transfer Failure indicates that the AGV does not sense drum presence after a transfer to NDE is initiated plus a time delay. The operator should check the NDE and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
104-CV-09-101C	ND-06-101CTF/A	Transfer Failure – PAN_A	Transfer Failure indicates that the AGV does not sense drum presence after a transfer to PAN is initiated plus a time delay. The operator should check the PAN and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	
104-CV-09-101D	ND-06-101DTF/A	Transfer Failure – PAN_B	Transfer Failure indicates that the AGV does not sense drum presence after a transfer to PAN is initiated plus a time delay. The operator should check the PAN and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	
104-CV-09-101E	ND-06-101ETF/A	Transfer Failure – GEA_A	Transfer Failure indicates that the AGV does not sense drum presence after a transfer to GEA is initiated plus a time delay. The operator should check the GEA and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	
104-CV-09-101F	ND-06-101FTF/A	Transfer Failure – GEA_B	Transfer Failure indicates that the AGV does not sense drum presence after a transfer to GEA_A is initiated plus a time delay. The operator should check the GEA and AGV for hardware problems or obstructions and then attempt to transfer the drum manually.	
104-CV-09-101A	**Ndea fault cont**	Equipment Fault; Examination Continuing - NDE_A	Equipment Fault ND-106-104A/IF; Examination Continuing - NDE A indicates that there is a problem with the NDE A vault, but the examination is continuing. The operator should check the vault hardware and software.	
104-CV-09-101A	**Ndeb fault cont**	Equipment Fault; Examination Continuing - NDE_B	Equipment Fault ND-106-104B/IF; Examination Continuing - NDE B indicates that there is a problem with the NDE B vault, but the examination is continuing. The operator should check the vault hardware and software.	
	09-ZSO-217/A	Airlock Door 17 Failed To Open	Door Failed To Open indicates that the airlock door 17 failed to open as indicated by open position switches 09-ZSO-217, 09-ZSO-218, 09-ZSO-251 or 09-ZSO-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to open door using local controls.	Yellow
	09-ZSO-218/A	Airlock Door 17A Failed To Open	Door Failed To Open indicates that the airlock door 17A failed to open as indicated by open position switches 09-ZSO-217, 09-ZSO-218, 09-ZSO-251 or 09-ZSO-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to open door using local controls.	Yellow
	09-ZSO-251/A	Airlock Door 18 Failed To Open	Door Failed To Open indicates that the airlock door 18 failed to open as indicated by open position switches 09-ZSO-217, 09-ZSO-218, 09-ZSO-251 or 09-ZSO-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to open door using local controls.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	09-ZSO-252/A	Airlock Door 18A Failed To Open	Door Failed To Open indicates that the airlock door 18A failed to open as indicated by open position switches 09-ZSO-217, 09-ZSO-218, 09-ZSO-251 or 09-ZSO-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to open door using local controls.	Yellow
	09-ZSC-217/A	Airlock Door 17 Failed To Close	Door Failed To Close indicates that the airlock door 17 failed to close as indicated by closed position switches 09-ZSC-217, 09-ZSC-218, 09-ZSC-251 or 09-ZSC-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
	09-ZSC-218/A	Airlock Door 17A Failed To Close	Door Failed To Close indicates that the airlock door 17A failed to close as indicated by closed position switches 09-ZSC-217, 09-ZSC-218, 09-ZSC-251 or 09-ZSC-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
	09-ZSC-251/A	Airlock Door 18 Failed To Close	Door Failed To Close indicates that the airlock door 18 failed to close as indicated by closed position switches 09-ZSC-217, 09-ZSC-218, 09-ZSC-251 or 09-ZSC-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
	09-ZSC-252/A	Airlock Door 18A Failed To Close	Door Failed To Close indicates that the airlock door 18A failed to close as indicated by closed position switches 09-ZSC-217, 09-ZSC-218, 09-ZSC-251 or 09-ZSC-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
104-CV-09-102	CV-09-102CT	NDE/NDA Buffer Storage Carousel Trouble	Carousel Trouble indicates that the carousel controller is unable to verify conveyor control or unable to complete a storage/retrieval request. The operator should check the carousel for hardware problems or obstructions and then attempt to operate the carousel manually.	Yellow
104-CV-09-102	CV-09-102/DF	NDE/NDA Buffer Storage Carousel Drum Not Found	Drum not found indicates that the drum requested for retrieval could not be found. The operator should visually verify that the requested drum is not in the RW Drum Storage Carousel. If the drum is found to be in the carousel with an unreadable bar code label, the operator should print a new bar code label and attach it to the drum. The operator may then switch carousel control to manual and retrieve the drum.	Yellow
104-CV-09-102	CV-09-102/CF	NDE/NDA Buffer Storage Carousel Full	Carousel has set bit indicating all drum positions are occupied.	Yellow
104-CV-09-102	CV-09-102TF	NDE/NDA Buffer Storage Carousel Transfer Fail	Failed to Transfer Drum AGV/carousel drum sensor does not sense drum position after transfer from/to carousel is initiated plus a time delay.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	Aira auto/man	Airlock Automatic Mode Interrupted - Airlock Conveyor System A	Airlock Automatic Mode Interrupted indicates that the (L-O-R) switch 09-HS-211A, 09-HS-212A, 09-HS-213A, 09-HS-214A, 09-HS-215A, 09-HS-216A, 09-HS-217A, 09-HS-218A, 09-HS-251A or 09-HS-252A has been taken out of Remote while the PCS is functioning in Auto Mode. All associated equipment stops and the system defaults to Manual Mode. The operator should place the switch in Local to restart the process and then place the switch in Remote. The affected system then needs to be placed in Auto Mode.	
	Airb auto/man	Airlock Automatic Mode Interrupted - Airlock Conveyor System B	Airlock Automatic Mode Interrupted indicates that the (L-O-R) switch 09-HS-211A, 09-HS-212A, 09-HS-213A, 09-HS-214A, 09-HS-215A, 09-HS-216A, 09-HS-217A, 09-HS-218A, 09-HS-251A or 09-HS-252A has been taken out of Remote while the PCS is functioning in Auto Mode. All associated equipment stops and the system defaults to Manual Mode. The operator should place the switch in Local to restart the process and then place the switch in Remote. The affected system then needs to be placed in Auto Mode.	
107-GB-07-101	07-PS-703	LLW Entry Port DO-07-101 Loss of Vacuum	PS-703 indicates that vacuum is not sensed between port door and drum lid. The operator should visually inspect the port to determine the cause of vacuum loss.	Yellow
107-GB-07-106	07-PS-704	LLW Exit Port DO-07-106 Loss of Vacuum	PS-704 indicates that vacuum is not sensed between port door and drum lid. The operator should visually inspect the port to determine the cause of vacuum loss.	Yellow
107-GB-07-102	FSL-378	LLW Sort Inert Gas Purge Low Flow	FSL-378 indicates low inert gas purge flow for the Delid/Lid fixture (RT-07-101), which will cause the automatic saw sequence to stop. The operator should inspect the inert gas bottle and replace if necessary.	Red
107-GB-07-302	07-FSL-332/A	TRU Sort Inert Gas Purge Low Flow	FSL-332 indicates low inert gas purge flow for the Delid/Lid fixture (RT-07-101), which will cause the automatic saw sequence to stop. The operator should inspect the inert gas bottle and replace if necessary.	Red
	09-ZS-252	Airlock Door 18A Passage Way Obstructed	Indicates that the airlock door 17, 17A, 18 or 18A passage way is obstructed for longer than X seconds after door open position switch indicates door is open, as indicated by photoeyes 09-ZS-217, 09-ZS-218, 09-ZS-251 or 09-ZS-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
	09-ZS-218	Airlock Door 17A Passage Way obstructed	Indicates that the airlock door 17, 17A, 18 or 18A passage way is obstructed for longer than X seconds after door open position switch indicates door is open, as indicated by photoeyes 09-ZS-217, 09-ZS-218, 09-ZS-251 or 09-ZS-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	09-ZS-217	Airlock Door 17 Passage Way Obstructed	Indicates that the airlock door 17, 17A, 18 or 18A passage way is obstructed for longer than X seconds after door open position switch indicates door is open, as indicated by photoeyes 09-ZS-217, 09-ZS-218, 09-ZS-251 or 09-ZS-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
	09-ZS-251	Airlock Door 18 Passage Way Obstructed	Indicates that the airlock door 17, 17A, 18 or 18A passage way is obstructed for longer than X seconds after door open position switch indicates door is open, as indicated by photoeyes 09-ZS-217, 09-ZS-218, 09-ZS-251 or 09-ZS-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
107-GB-07-102	PSL-378	LLW Sort Inert Gas Purge Cylinder Low Pressure	PSL-378 indicates low inert gas pressure for the Delid/Lid fixture (RT-07-101), The operator should inspect the inert gas bottle and replace if necessary.	Yellow
	09-ZSC-252	Airlock Door 18A Failed to Close	Indicates that the airlock door 17, 17A, 18 or 18A failed to close as indicated by closed position switches 09-ZSC-217, 09-ZSC-218, 09-ZSC-251 or 09-ZSC-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
	09-ZSO-252	Airlock Door 18A Failed to Open	Indicates that the airlock door 17, 17A, 18 or 18A failed to open as indicated by open position switches 09-ZSO-217, 09-ZSO-218, 09-ZSO-251 or 09-ZSO-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to open door using local controls.	Yellow
	09-ZSC-218	Airlock Door 17A Failed to Close	Indicates that the airlock door 17, 17A, 18 or 18A failed to close as indicated by closed position switches 09-ZSC-217, 09-ZSC-218, 09-ZSC-251 or 09-ZSC-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to close door using local controls.	Yellow
	09-ZSO-218	Airlock Door 17A Failed to Open	Indicates that the airlock door 17, 17A, 18 or 18A failed to open as indicated by open position switches 09-ZSO-217, 09-ZSO-218, 09-ZSO-251 or 09-ZSO-252, respectively. The operator should inspect conveyor hardware for problems or obstructions and then attempt to open door using local controls.	Yellow
107-CV-09-202	CV-09-202/DF	RW Buffer Storage Carousel Drum Not Found	Indicates that the drum requested for retrieval could not be found. The operator should visually verify that the requested drum is not in the RW Drum Storage Carousel. If the drum is found to be in the carousel with an unreadable bar code label, the operator should print a new bar code label and attach it to the drum. The operator may then switch carousel control to manual and retrieve the drum.	Yellow
107-CV-09-202	CV-09-202/TF	RW Buffer Storage Carousel Failed to Transfer Drum	AGV/carousel drum sensor does not sense drum position after transfer from/to carousel is initiated plus a time delay.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
107-CV-09-202	CV-09-202CT	RW Buffer Storage Carousel Trouble (O = Trouble)	Indicates that the carousel controller is unable to verify conveyor control or unable to complete a storage/retrieval request. The operator should check the carousel for hardware problems or obstructions and then attempt to operate the carousel manually.	Yellow
107-GB-07-302	07-PSL-332/A	TRU Sort Inert Gas Purge Cylinder Low Pressure	PSL-332 indicates low inert gas pressure for the Delid/Lid fixture (RT-07-301), The operator should inspect the inert gas bottle and replace if necessary.	Yellow
	12-RSH-505	Process Area High Level Gamma Radiation Alarm	Indicates that the area gamma radiation level is too high, as indicated by gamma detectors 12-RITA-505, 506, 507 or 508	Red
	12-RSH-508	Process Area High Level Gamma Radiation Alarm	Indicates that the area gamma radiation level is too high, as indicated by gamma detectors 12-RITA-505, 506, 507 or 508	Red
	12-RSH-509	Process Area Alpha Cam High Radiation Alarm	Indicates that the area alpha radiation level is too high, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512, or 545.	Red
	12-RSH-510	NDE/NDA Alpha Cam High Radiation Alarm	Indicates that the area alpha radiation level is too high, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512, or 545.	Red
	12-RSH-511	Ship/Rec Alpha Cam High Radiation Alarm	Indicates that the area alpha radiation level is too high, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512, or 545.	Red
	12-RSH-512	Process HVAC Alpha Cam High Radiation Alarm	Indicates that the area alpha radiation level is too high, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512, or 545.	Red
	12-RSH-513	Process Area Beta Cam High Radiation Alarm	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 514, 515, 516 or 544.	Red
	12-RSH-514	NDE/NDA Beta Cam High Radiation Alarm	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 514, 515, 516 or 544.	Red
	12-RSH-515	Ship/Rec Beta Cam High Radiation Alarm	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 514, 515, 516 or 544.	Red
	12-RSH-516	Process HVAC Area Beta Cam High Radiation Alarm	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 514, 515, 516 or 544.	Red
	12-RSH-544	Process Area Beta Cam High Radiation Alarm	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 514, 515, 516 or 544.	Red
	12-RSH-545	Process Alpha Cam High Radiation Alarm	Indicates that the area alpha radiation level is too high, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512, or 545.	Red
	12-XS-505	Process Area Gamma Instrument Trouble	Indicates that there is a problem with the area gamma radiation detector, as indicated by gamma detectors 12-RITA-505, 506, 507 or 508.	Red
	12-XS-508	Process Area Gamma Instrument Trouble	Indicates that there is a problem with the area gamma radiation detector, as indicated by gamma detectors 12-RITA-505, 506, 507 or 508.	Red

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
Attachment 4		HVAC Warning Guides		
	11-FI-617A	Glovebox Exhaust Filter Train A Low Airflow	Indicates that the airflow through the glovebox exhaust filter train (A or B) is too low.	Yellow
	11-FI-617A	Glovebox Exhaust Filter Train A High Airflow	Indicates that the airflow through the glovebox exhaust filter train (A or B) is too high.	Yellow
	11-FI-617B	Glovebox Exhaust Filter Train B Low Airflow	Indicates that the airflow through the glovebox exhaust filter train (A or B) is too low.	Yellow
	11-FI-617B	Glovebox Exhaust Filter Train B High Airflow	Indicates that the airflow through the glovebox exhaust filter train (A or B) is too high.	Yellow
	11-FI-618A	Process Exhaust Filter Train A Low Airflow	Indicates that the airflow through the process exhaust filter train (A or B) is too low.	Yellow
	11-FI-618A	Process Exhaust Filter Train A High Airflow	Indicates that the airflow through the process exhaust filter train (A or B) is too high.	Yellow
	11-FI-618B	Process Exhaust Filter Train B Low Airflow	Indicates that the airflow through the process exhaust filter train (A or B) is too low.	Yellow
	11-FI-618B	Process Exhaust Filter Train B High Airflow	Indicates that the airflow through the process exhaust filter train (A or B) is too high.	Yellow
	11-MI-632A	Control Room Low Humidity	Indicates that the control room humidity is too low.	Yellow
	11-MI-632A	Control Room High Humidity	Indicates that the control room humidity is too high.	Yellow
	11-MI-632B	Control Room Low Humidity	Indicates that the control room humidity is too low.	Yellow
	11-MI-632B	Control Room High Humidity	Indicates that the control room humidity is too high.	Yellow
	11-TI-609A	Process Area High Temperature	Indicates that the process area temperature is too high.	Yellow
	11-TI-609A	Process Area Low Temperature	Indicates that the process area temperature is too low.	Yellow
	11-TI-609B	Process Area High Temperature	Indicates that the process area temperature is too high.	Yellow
	11-TI-609B	Process Area Low Temperature	Indicates that the process area temperature is too low.	Yellow
	11-TI-618A	Process Exhaust Filter Train A Low Temperature	Indicates that the process exhaust filter train (A or B) temperature is too low.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	11-TI-618B	Process Exhaust Filter Train B Low Temperature	Indicates that the process exhaust filter train (A or B) temperature is too low.	Yellow
	11-TI-627	NDE/NDA Area Low Temperature	Indicates that the NDE/NDA area temperature is too low.	Yellow
	11-TI-627	NDE/NDA Area High Temperature	Indicates that the NDE/NDA area temperature is too high.	Yellow
	11-TI-652	Chilled Glycol Low Temperature	Indicates that the chilled glycol temperature is too low.	Yellow
	11-TI-652	Chilled Glycol High Temperature	Indicates that the chilled glycol temperature is too high.	Yellow
203-AH-11-201A	11-PDISH-601A	Process AHU A Pre-Filter High Diff Press	Indicates that the differential pressure across the process AHU pre-filter (A or B) is too high.	Yellow
203-AH-11-201B	11-PDISH-601B	Process AHU B Pre-Filter High Diff Press	Indicates that the differential pressure across the process AHU pre-filter (A or B) is too high.	Yellow
203-AH-11-201A	11-PDISH-602A	Process AHU A Final Filter High Diff Press		Yellow
203-AH-11-201B	11-PDISH-602B	Process AHU B Final Filter High Diff Press		Yellow
113-FT-11-201A	11-PDISH-611A	Glovebox Exhaust B Pre-Filter High Differential Pressure	Indicates that the differential pressure across the glovebox exhaust pre-filter train (A or B) is too high.	Yellow
113-FT-11-201B	11-PDISH-611B	Glovebox Exhaust B Pre-Filter High Differential Pressure	Indicates that the differential pressure across the glovebox exhaust pre-filter train (A or B) is too high.	Yellow
113-FT-11-202A	11-PDISH-612A	Process Exhaust A Pre-Filter High Differential Press	Indicates that the differential pressure across the process exhaust (A or B) pre-filter is too high	Yellow
113-FT-11-202B	11-PDISH-612B	Process Exhaust B Pre-Filter High Differential Press	Indicates that the differential pressure across the process exhaust (A or B) pre-filter is too high	Yellow
203-AH-11-101	11-PDISH-621	Shipping/Receiving & NDE/NDA Pre-Filter High Differential Press	Indicates that the differential pressure across the shipping/receiving & NDE/NDA pre-filter is too high.	Yellow
203-AM-11-501A	11-PDISH-631A	Computer & Control Room AHU A Pre-Filter High Differential	Indicates that the differential pressure across the computer & control room AHU (A or B) pre-filter is too high	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
203-AH-11-501B	11-PDISH-631B	Computer & Control Room AHU B Pre-Filter High Differential	Indicates that the differential pressure across the computer & control room AHU (A or B) pre-filter is too high.	Yellow
203-AH-11-501A	11-PDISH-632A	Computer & Control Room AHU A Final-Filter High Differential	Indicates that the differential pressure across the computer & control room AHU (A or B) final filter is too high.	Yellow
203-AH-11-501B	11-PDISH-632B	Computer & Control Room AHU B Final-Filter High Differential	Indicates that the differential pressure across the computer & control room AHU (A or B) final filter is too high.	Yellow
203-AH-11-401	11-PDISH-641	Administration Aurea AHU Pre-Filter High Differential Press	Indicates that the differential pressure across the administration area AHU pre-filter is too high.	Yellow
203-AH-11-101	11-XA-621	Shipping/Receiving & NDE/NDA AHU Controller, 203-C-11-101 Trouble	Indicates that there is a problem with the shipping/receiving & NDE/NDA AHU controller.	Yellow
203-AH-11-501A	11-XA-631A	Computer & Control Room AHU Controller, C-11-501A Trouble	Indicates that there is a problem with the computer & control room AHU controller (A or B).	Yellow
203-AH-11-501B	11-XA-631B	Computer & Control Room AHU Controller, C-11-501B Trouble	Indicates that there is a problem with the computer & control room AHU controller (A or B).	Yellow
203-AH-11-401	11-XA-641	Administration Area Controller, C-11-401 Trouble	Indicates that there is a problem with the administration area controller.	Yellow
	11-XA-651	Chilled Glycol Controller, 118-C-11-101 System Trouble	Indicates that there is a problem with the chilled glycol controller.	Yellow
203-AH-11-301	11-XA-661	Locker Room Area Controller C-11-301 Trouble	Indicates that there is a problem with the locker room area controller.	Yellow
203-AH-11-201A	11-XA-601A	Process Supply AHU Controller, C-11-201A Trouble	Indicates that there is a problem with the process supply AHU controller (A or B).	Yellow
203-AH-11-201B	11-XA-601B	Process Supply AHU Controller, C-11-201B Trouble	Indicates that there is a problem with the process supply AHU controller (A or B).	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
113-FT-11-201B	11-XA-611A	Glovebox Exhaust System Controller, C-11-201A Trouble	Indicates that there is a problem with the glovebox exhaust system controller (A or B).	Yellow
113-FT-11-201B	11-XA-611B	Glovebox Exhaust System Controller, C-11-201B Trouble	Indicates that there is a problem with the glovebox exhaust system controller (A or B).	Yellow
113-FT-11-202A	11-XA-612A	Process Exhaust System Controller, C-11-201A Trouble	Indicates that there is a problem with the process exhaust system controller (A or B).	Yellow
113-FT-11-202B	11-XA-612B	Process Exhaust System Controller, C-11-201B Trouble	Indicates that there is a problem with the process exhaust system controller (A or B).	Yellow
	11-TI-688	Locker Room High Temperature	Indicates that the locker room temperature is too high.	Yellow
	11-TI-688	Locker Room Low Temperature	Indicates that the locker room temperature is too low.	Yellow
	12-XS-509	Process Area Alpha Cam Trouble	Indicates that there is a problem with the area alpha cam, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512 or 545.	Yellow
	12-XS-510	NDE/NDA Area Alpha Cam Trouble	Indicates that there is a problem with the area alpha cam, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512 or 545.	Yellow
	12-XS-511	Ship/Rec Area Alpha Cam Trouble	Indicates that there is a problem with the area alpha cam, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512 or 545.	Yellow
	12-XS-512	Process HVAC Alpha Cam Trouble	Indicates that there is a problem with the area alpha cam, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512 or 545.	Yellow
	12-XS-513	Process Area Beta Cam Trouble	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 515, 516 or 544.	Yellow
	12-XS-514	NDE/NDA Area Beta Cam Trouble	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 515, 516 or 544.	Yellow
	12-XS-515	Ship/Rec Area Beta Cam Trouble	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 515, 516 or 544.	Yellow
	12-XS-516	Process HVAC Area Beta Cam Trouble	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 515, 516 or 544.	Yellow
	12-XS-544	Process Area Alpha Beta Trouble	Indicates that the area beta radiation level is too high, as indicated by beta cams 12-RITA-501, 503, 513, 515, 516 or 544.	Yellow
	12-XS-545	Process Alpha Cam Trouble	Indicates that there is a problem with the area alpha cam, as indicated by alpha cams 12-RITA-502, 504, 509, 510, 511, 512 or 545.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
203-AH-11-501A	11-PDISL-633A	Computer Control Room AHU A Fan Fail	Indicates that the computer & control room supply fan A (SF-11-501A) has failed.	Red
203-AH-11-501B	11-PDISL-633B	Computer Control Room AHU B Fan Fail	Indicates that the computer & control room supply fan B (SF-11-501B) has failed.	Red
113-FT-11-202A	11-PDISL-618A	Process Exhaust Filter Train A Fan Failed	Indicates that the process exhaust filter train (EF-11-202A) fan has failed.	Red
113-FT-11-202B	11-PDISL-618B	Process Exhaust Filter Train B Fan Failed	Indicates that the process exhaust filter train (EF-11-202B) fan has failed.	Red
203-AH-11-201A	11-PDISL-603A	Process Supply AHU A Fan Fail	Indicates that the process AHU supply fan (SF-11-201A) has failed.	Red
203-AH-11-201B	11-PDISL-603B	Process Supply AHU B Fan Fail	Indicates that the process AHU supply fan (SF-11-201B) has failed.	Red
113-FT-11-201A	11-PDISL-617A	Glovebox Exhaust Filter Train A Fan Failed	Indicates that the glovebox exhaust filter train (EF-11-201A) fan has failed.	Red
113-FT-11-201B	11-PDISL-617B	Glovebox Exhaust Filter Train B Fan Failed	Indicates that the glovebox exhaust filter train (EF-11-201B) fan has failed.	Red
107-GB-07-301	11-FIT-305/A	TRU entry low exhaust bypass flow	Low Exhaust Bypass Flow Indicates that a low flow condition exists, indicated by flow transmitter 11-FIT-305, if the entry/exit port is not closed as indicated by position switch 07-ZSC-803A. The operator should inspect switch for hardware problems or obstructions.	Red
107-GB-07-101	07-PDISL-333	LLW Entry G.B. Low Differential Pressure	Low Glovebox Differential Pressure indicates there Is Low Glovebox/Atmosphere Differential Pressure.	Red
107-GB-07-101	07-PDISL-341	LLW Sorting G.B. Low Differential Pressure	Low Glovebox Differential Pressure indicates there Is Low Glovebox/Atmosphere Differential Pressure.	Red
107-GB-07-106	07-PDISL-353	LLW Exit G.B. low Differential Pressure	Low Glovebox Differential Pressure indicates there Is Low Glovebox/Atmosphere Differential Pressure.	Red
107-GB-07-401	07-PDISL-375 /A	TRU RWM G.B. low Differential Pressure	Low Glovebox Differential Pressure indicates there Is Low Glovebox/Atmosphere Differential Pressure.	Red
107-GB-07-201	07-PDISL-393	LLW RWM G.B. low Differential Pressure	Low Glovebox Differential Pressure indicates there Is Low Glovebox/Atmosphere Differential Pressure.	Red
	12-FSL-550	ISEM Record Sampler Low Flow Alarm	ISEM Record Sampler Low Flow FT-550 indicates that the ISEM record sampler flow is too low.	Red
	12-RSH-551	ISEM Alpha Cam Radiation Level	ISEM Alpha Cam High Radiation indicates that the ISEM alpha cam radiation is too high.	Red
	12-XS-551	ISEM Alpha Cam Trouble Alarm	ISEM Alpha Cam Trouble indicates that there is a problem with the ISEM alpha CAM.	Red

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	12-XS-552	ISEM Beta Cam Trouble Alarm	ISEM Beta Cam Trouble indicates that there is a problem with the ISEM beta CAM.	Red
BD-13-101	13-ESL-031	Bus Duct Under Voltage Alarm	Bus Duct Under Voltage indicates that the bus duct BD-13-101 voltage is too low.	Red
BD-13-102	13-ESL-032	Bus Duct Under Voltage Alarm	Bus Duct Under Voltage indicates that the bus duct BD-13-102 voltage is too low.	Red
T-13-101	13-XS-031	Transformer Trouble	Transformer Trouble indicates that there is a problem with the transformer.	Red
T-13-102	13-XS-032	Transformer Trouble	Transformer Trouble indicates that there is a problem with the transformer.	Red
	13-XS-033	Uninterruptible Power Supply Trouble	Uninterruptible Power Supply Trouble indicates that there is a problem with the uninterruptible power supply.	Red
RF-11-101	11-PDISL-624	Shipping/Receiving NDE/NDA Return Fan Fail		
	13-XS-581B	Fire Protection System Trouble	When the Fire System panel in the lobby indicates a trouble in one of the fire alarm or suppression systems, an alarm is sent to RTAP via LCU104. A parallel alarm is sent to the annunciator panel.	Red
	12-RIT-505	Process Area South High Level Gamma Radiation Alarm	Area High Level Gamma Radiation indicates that the area gamma radiation level is too high, as indicated by gamma detectors	Yellow
	12-RIT-508	Process Area North High Level Gamma Radiation Alarm	Area High Level Gamma Radiation indicates that the area gamma radiation level is too high, as indicated by gamma detectors	Yellow
	12-RITA-509	Process Area South Alpha Cam High Radiation Alarm	Area Alpha Cam High Radiation Indicates that the area alpha radiation level is too high, as indicated by alpha cams	Yellow
	12-RITA-510	NDE/NDA Area Alpha Cam High Radiation Alarm	Area Alpha Cam High Radiation Indicates that the area alpha radiation level is too high, as indicated by alpha cams	Yellow
	12-RITA-511	Shipping/Receiving Alpha Cam High Radiation Alarm	Area Alpha Cam High Radiation Indicates that the area alpha radiation level is too high, as indicated by alpha cams	Yellow
	12-RITA-512	Process Area HVAC Area Alpha Cam High Radiation Alarm	Area Alpha Cam High Radiation Indicates that the area alpha radiation level is too high, as indicated by alpha cams	Yellow
	12-RITA-513	Process Area North Beta Cam High Radiation Alarm	Area Beta Cam High Radiation indicates that the area beta radiation level is too high, as indicated by beta cams	Yellow
	12-RITA-514	NDE/NDA Area Beta Cam High Radiation Alarm	Area Beta Cam High Radiation indicates that the area beta radiation level is too high, as indicated by beta cams	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	12-RITA-515	Shipping/Receiving Area Beta Cam High Radiation Alarm	Area Beta Cam High Radiation indicates that the area beta radiation level is too high, as indicated by beta cams	Yellow
	12-RITA-516	Process HVAC Area Beta Cam High Radiation Alarm	Area Beta Cam High Radiation indicates that the area beta radiation level is too high, as indicated by beta cams	Yellow
	12-RITA-544	Process Beta Cam High Radiation Alarm	Area Beta Cam High Radiation indicates that the area beta radiation level is too high, as indicated by beta cams	Yellow
	12-RITA-545	Process Alpha Cam High Radiation Alarm	Area Alpha Cam High Radiation indicates that the area alpha radiation level is too high, as indicated by alpha cams	Yellow
	12-RITA-551	ISEM Alpha Cam High Radiation Alarm	ISEM Alpha Cam High Radiation indicates that the ISEM alpha cam radiation is too high.	Yellow
	12-RITA-552	ISEM Beta Cam High Radiation Alarm	ISEM Beta Cam High Radiation indicates that the ISEM beta cam radiation is too high.	Yellow
	12-FT-550	ISEM Record Sampler Low Flow	ISEM Record Sampler Low Flow indicates that the ISEM record sampler flow is too low.	Yellow
	12-FT-551	ISEM CAM Low Flow	SEM Alpha Cam Low Flow indicates that the ISEM alpha cam flow is too low.	Yellow
	air dryer	Instrument Air Dryer Package Trouble	Instrument Air Dryer Package Trouble indicates that there is a problem with the instrument air dryer package.	Yellow
118-C-13-101A	compressor a	Air Compressor A Trouble	Air Compressor Trouble indicates that there is a problem with air compressor 101A.	Yellow
118-C-13-101B	compressor b	Air Compressor B Trouble	Air Compressor Trouble indicates that there is a problem with air compressor 101B.	Yellow
203-AH-11-301	11-PDISL-663	Locker Room AHU Fan Fail		Red
	11-PDIT-601	Non-Confinement/Zone II Process HVAC Differential Pressure	Indicates that the differential pressure across the two areas is too low.	Red
	11-PDIT-602	Non-Confinement/Zone II Process Differential Pressure	Indicates that the differential pressure across the two areas is too low.	Red
	12-RSH-552	ISEM Beta Radiation Level High Alarm	ISEM Beta Cam High Radiation indicates that the ISEM beta cam radiation is too high.	Red
	dms rwm fml	AREA 3 FISSILE INVENTORY NETCOM 5.4.2 FGE LIMIT EXCEEDED	Each movement of a waste container into or out of the AREA 3 isolated facility boundary in the process area results in a CL message (NETCOM 5.3.1) from the PCS to the DMS. The DMS then calculates a new Pu FGE value for the isolated facility and sends the result back to the PCS in an FML message (NETCOM 5.4.2) along a 'T' or and 'F' to indicate if the alarm setpoint has been exceeded. If a 'T' is sent in the message. This is a TSR limit.	Red

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	dms tru fml	TRU FISSILE INVENTORY NETCOM 5.4.2 FGE LIMIT EXCEEDED	Each movement of a waste container into or out of the TRU GLOVEBOX isolated facility boundary in the process area results in a CL message (NETCOM 5.3.1) from the PCS to the DMS. The DMS then calculates a new Pu FGE value for the isolated facility and sends the result back to the PCS in an FML message (NETCOM 5.4.2) along a 'T' or and 'F' to indicate if the alarm setpoint has been exceeded. If a 'T' is sent in the message. This is a TSR limit.	Red
	12-FSL-551	ISEM CAM FLOW RATE FT551/552 LOW FLOW	The ISEM CAM sends a digital signal to the PCS when it detects a low flow condition.	Red
	network dms	PCS COMMUNICATION DOWN	The PCS Server has lost communication with the Data Management System	Red
	lcu101 trouble	LCU101 LCU101 LCU101 COMM TROUBLE	The PCS Server has lost communication with the Programmable Logic Controller associated with Local Control Unit 104-CNR-12-101	Red
	lcu102 trouble	LCU102 LCU102 LCU102 COMM TROUBLE	The PCS Server has lost communication with the Programmable Logic Controller associated with Local Control Unit 104-CNR-12-102	Red
	lcu103 trouble	LCU103 LCU103 LCU103 COMM TROUBLE	The PCS Server has lost communication with the Programmable Logic Controller associated with Local Control Unit 104-CNR-12-103	Red
	lcu104 trouble	LCU104 LCU104 LCU104 COMM TROUBLE	The PCS Server has lost communication with the Programmable Logic Controller associated with Local Control Unit 203-CNR-12-104	Red
	dms gen alarm	DMS *MESSAGE	The PCS has received a status message from the DMS computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Red
	agv gen alarm	AGV *MESSAGE	The PCS has received a status message from the AGV computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Red
	asrs gen alarm	ASRS *MESSAGE	The PCS has received a status message from the ASRS computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Red
	pam gen alarm	PAM *MESSAGE	The PCS has received a status message from the PAM computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Red
	noloc	ASRS NO LCATION AVAILABLE	The ASRS was asked to store a pallet when there are no locations available.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	drum not found	ASRS DRUM NOT FOUND	The ASRS was asked to retrieve a drum that it could not find in its database.	Yellow
	asrs pin mismatch	ASRS DRUM PIN MISMATCH	A validation check is performed when a drum is scanned at the pallet stand to ensure that it is a valid PIN. The PIN scanned must appear in either the RECDCK table or the INFEED STAGING AREA table.	Yellow
	LT-201ETF	LLW RWM EXIT LT-201E TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-201DTF	LLW RWM EXIT LT-201D TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
107-CV-09-204	CV-09-204TF	55 GAL EMPTY DRUM STAGING CONV	Staging Conveyor Transfer Failure indicates that the drum transfer to or from the conveyor did not complete successfully. The alarm clears after a time delay.	Yellow
107-CV-09-203	CV-09-203TF	85 GAL EMPTY DRUM STAGING CONV	Staging Conveyor Transfer Failure indicates that the drum transfer to or from the conveyor did not complete successfully. The alarm clears after a time delay.	Yellow
107-CV-09-202	CV-09-202CF	RW Buffer Storage Carousel Carousel Full	Indicates that there is no space available in the carousel for storage of the drum.	Yellow
107-CV-09-202	CV-09-202ND	RW Buffer Storage Carousel No "READY" status drums in category.	Indicates that there are no drums in the carousel of the type selected that have been designated as "READY" for retrieval.	Yellow
	LT-201FTF	LLW RWM XFER LT-201F TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-202ATF	LLW ENTRY LT-202A TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-202CTF	LLW EXIT LT-202C TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-203ATF	LLW RWM XFER LT-203A TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-202ETF	TRU LDO2 LT-202E TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-203CTF	TRU EMPTY COMPACT LT-203C TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	LT-202DTF	TRU LDO1 LT-202D TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-202BTF	TRU ENTRY LT-202B TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-203BTF	TRU RWM XFER LT-203B TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-201ATF	TRU RWM EXIT LT-201A TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-201BTF	TRU RWM EXIT LT-201B TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
	LT-201CTF	TRU RWM XFEER LT-201C TRANSFER FAIL	Lift table Transfer Failure indicates that the drum transfer to or from the lift table did not complete successfully. The alarm clears after a time delay.	Yellow
107-GB-07-301	07-PS-803/A	TRU ENTRY PORT DO-07-301 LOSS OF VACUUM	The TRU Entry port door looses vacuum used to hold the lid attached to the door.	Yellow
	LT- 202A/NOEX	LLW ENTRY LT-202A NO LLW GENEXITS AVAILABLE	If the 85 gallon overpack drum at the llw entry lift table is declared contaminated, then it is sent to a LLW GENEXIT position. These positions include the LLW EXIT port, the LLW RWM RESTRICTED WASTE port, and two positions in the RWM Carousel.	Yellow
	LT- 202B/NOEX	TRU ENTRY LT-202B NO LLW GENEXITS AVAILABLE	If the 85 gallon overpack drum at the llw entry lift table is declared contaminated, then it is sent to a LLW GENEXIT position. These positions include the LLW EXIT port, the LLW RWM RESTRICTED WASTE port, and two positions in the RWM Carousel.	Yellow
	LT- 201DPMM	LLW RWM EXIT LT-201D PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-201EPMM	LLW RWM EXIT LT-201E PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	LT-201FPMM	LLW RWM XFER LT-201F PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-202APMM	LLW ENTRY LT-202A PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-202CPMM	LLW EXIT LT-202C PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-203APMM	LLW RWM XFER LT-203A PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-201APMM	TRU RWM EXIT LT-201A PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-201BPMM	TRU RWM EXIT LT-201B PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-201CPMM	TRU RWM XFER LT-201C PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-202EPMM	TRU LDO2 LT-202E PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-203CPMM	TRU EMPTY COMPACT LT-203C PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow

Table 4- 1 Alarm Summary By Tag Number PLC Alarm Bit

Equipment Tag	RTAP Tag	Short Description	Detailed Description	Color
	LT-202DPMM	TRU LDO1 LT-202D PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-202BPMM	TRU ENTRY LT-202B PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
	LT-203BPMM	TRU RWM XFER LT-203B PIN MISMATCH	A lift table PIN MISMATCH indicates that the drum PIN scanned at the lift table did not match the drum PIN that was tracked to the lift table in the PCS. The PIN that the PCS thinks is at the lift table is displayed on RTAP. Cancel operation and scan the correct PIN.	Yellow
107-GB-07-302	07-XA-307A	TRU SORT EMPTY COMPACTOR HPU TROUBLE	A Trouble signal has been received from the TRU empty drum compactor.	Yellow
107-GB-07-102	07-XA-302	LLW SORT SUPERCOMPACTOR HPU TROUBLE	A Trouble signal has been received from the LLW supercompactor.	Yellow
	dms gen warning	DMS *MESSAGE	The PCS has received a status message from the DMS computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Yellow
	agv gen warning	AGV *MESSAGE	The PCS has received a status message from the AGV computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Yellow
	asrs gen warning	ASRS *MESSAGE	The PCS has received a status message from the ASRS computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Yellow
	pam gen warning	PAM *MESSAGE	The PCS has received a status message from the PAM computer containing a numerical code and a message. The Numerical code indicates the severity of the message and tells the PCS whether to display the message in RED, YELLOW, or GREEN.	Yellow
END OF TABLE				

Table of Contents

List of Tables

5.0 PROGRAMMABLE LOGIC CONTROLLERS

5.1 OVERVIEW

This section describes the various Plant Control System (PCS) modules that reside on the primary programmable logic controllers (PLCs). Each PLC program file is briefly described at a high level. A list of ASCII constants is provided for each PLC. For additional information on data tables and other PLC control and data structures, see appendix B of this document, "PLC Memory Maps".

5.2 LOCAL CONTROL UNIT 101

The program files in 104-CNR-12-101 (Local Control Unit [LCU] 101) support the Shipping/Receiving and Nondestructive Examination (NDE)/Nondestructive Assay (NDA) areas of the Waste Receiving and Processing (WRAP) facility.

5.2.1 Local Control Unit 101 Program File 10: Shipping and Receiving

This file handles all of the control for the Receiving Dock as well as the Empty Drum Storage Area.

5.2.1.1 Receiving Dock.

Drums are received and stored at the receiving dock and empty drum storage areas of WRAP. Program file 10 processes bar code data when the bar code scanned is a location bar code for either the receiving dock or the empty drum storage area.

As drums are scanned, they are added to the temporary Receiving table. This table can hold 50 8-word drums. The current number of scanned drums is shown on the portable scanner. The scanner also shows the number of available positions in the Pending (or the temporary Receiving) table. Drums are listed in the Pending table when the Data Management System (DMS) sends a Container Location (5.4.1) for the Receiving Dock (RECDCK) file. The drums remain listed in the Pending table until they are either stored into the Automatic Stacker/Retrieval System (AS/RS) or are scanned at the Infeed Scale Conveyor (i.e. the drums are on the floor). The Pending table can hold 50, 8-word drums. To prevent overflow of the Pending table, the operator is only allowed to receive (i.e. scanning at the RECDCK and sitting on the floor) up to 50 drums at any given time.

After the Container Location Update message is sent for the Receiving Dock, the DMS checks the incoming drums against the Facility Curie Limit. If the limit is not exceeded, the DMS issues a Container Location Update message (Netcom 5.4.1), accepting the drums into the

WRAP 1 facility. The AS RS file in LCU 104, where the Received Drums Table is located, processes this message.

If a drum PIN is scanned after receiving an "EMPSTR" bar code, the drum PIN is compared against the drum PINs in the Received Drums Table. If the drum PIN is found, operations may continue. If the drum PIN in not found (the drum has not yet been received into the WRAP 1 facility), the drum pin mismatch alarm is generated. A prompt is displayed on the bar code reader indicating that a drum pin mismatch has occurred.

When the Facility Curie Alarm is active, the Receiving Dock temporary drum table is cleared and no drum PINs can be scanned at the Receiving Dock.

5.2.1.2 Drum Infeed Conveyor A.

Drum infeed conveyor A is the first staging conveyor for entry into the WRAP waste process. Drums are manually loaded onto the conveyor. The conveyor moves the drums onto the drum scale/conveyor where they are weighed. The drums then move onto the drum infeed conveyor B where the Automatically Guided Vehicle (AGV) picks them up.

5.2.1.3 Drum Scale Conveyor A.

"Drum scale conveyor A" is the weigh scale conveyor after drum infeed conveyor A. Drums are weighed using this scale and then moved on to the drum infeed conveyor B for pick up by the AGV.

This file is only used after receipt of a drum PIN bar code scanned at the drum scale conveyor A location (INFDCVYRW).

When a drum PIN bar code is scanned at the drum scale conveyor A location, the drum PIN is compared to the drum PINs in the Infeed Staging table and the Received Drums data tables. If the drum PIN is found in either table, the weight is read from the weight transmitter and the drum PIN, the drum weight, and the drum location are sent to the DMS via the Container Location with Weight message (Netcom 5.3.2). If the drum PIN is not found in either table, a Drum PIN Mismatch alarm is generated. If the weight exceeds the upper or lower limits, a Weight out-of-bounds alarm is generated.

The Infeed Staging area drum data table and the Received Drums PIN table are mirrored in LCU 101 to allow easier searches through the tables when a drum PIN is scanned at the drum scale conveyor A. When a drum PIN is found in either table, the file triggers a message to be sent (via the Supervisory Control File) to LCU 104 to delete the drum PIN from the appropriate table.

When the drum PIN has been found in the Infeed Staging area drum data table, an entry is made in the Drum Scale Conveyor A data table. This entry includes the drum PIN, the drum

Process Route, the Sample/Compliant data from the Infeed Staging area table, and the weight from the weight transmitter. In addition, the "Drum Present" flag is set in the drum status word.

When the drum PIN has been found in the Received Drums data table, an entry is made in the Drum Scale Conveyor A data table that includes the drum PIN scanned, a fixed Process Route of 9 (NDE examination only), and the weight from the weight transmitter. In addition, the "Drum Present" flag is set and the Sample/Compliant fields are reset in the drum status word.

5.2.2 Local Control Unit 101 Program File 11: Drum Scale Conveyor B

This file handles all control for the drum scale conveyor B. This file also controls the barcode sequences related to all shipping and waste box operations.

The "Drum Scale Conveyor B" (DISCHCVRW location) is the conveyor after the drum discharge conveyor. Drums for storage or shipment are indexed onto the drum scale conveyor B where they are weighed and then manually removed from the conveyor.

When a drum PIN is scanned at the drum scale conveyor B (after a DISCHCVRW location bar code has been received), the drum PIN is compared to the drum PIN in the drum scale conveyor B data table, which was updated when the drum was indexed from the discharge conveyor onto the scale conveyor. If the drum PINs are identical, the drum weight is read from the weight transmitter and operations may continue. If the drum PINs are not identical, the Drum PIN Mismatch alarm is set and the operation must be aborted.

The drum data of the drum in the "Ready" position of the discharge conveyor is copied into the Drum Scale Conveyor B data table after the "Index" pushbutton has been pushed and when the drum is detected on the scale conveyor. The previous weight is replaced by the weight from the weight transmitter after the drum PIN has been scanned and verified.

5.2.3 Local Control Unit 101 Program File 14: Drum Infeed Conveyor B

"Drum Infeed Conveyor B" is the conveyor after the drum scale conveyor A. Drums are indexed from the scale conveyor and are moved to the end of the conveyor to await pick-up by the AGV.

This file handles all conveyor control and local AGV interfacing via infrared Communications System (IRCOM) switches. The IRCOM switches indicate when the AGV and the conveyor are ready to transfer drums.

When the "Index" pushbutton has been pushed to index the drum from the drum scale conveyor A to the infeed conveyor B and both conveyors have started, the drum data is transferred from the Drum Scale Conveyor B data Table to the next empty position data table on the infeed conveyor. If the Infeed Conveyor B drum at Position #1 bit is energized, indicating

that the Infeed Conveyor B is full (all four positions occupied) and the "Index" pushbutton is pushed, the drum scale conveyor A will not run.

When the drum is transferred to the "Ready" position (position #4) of the infeed conveyor B, the PCS verifies that the process route contained in the drum data table for the drum in the "Ready" position is valid. If the process route is valid, and if the Shipping/Receiving/NDE/NDA Isolation Door is in the "Remote" mode and AGV pick-ups are enabled (through the switch on the Real Time Applications Platform (RTAP) Infeed Conveyors display), the file issues an AGV Transport Command message (Netcom 5.5.3) to the Automatic Guided Vehicle Control System (AGVCS) to command a pick-up of the drum at Infeed Conveyor B and request a drop-off of the drum at an NDE vault. If the process route is invalid, the Drum Infeed Conveyor B Bad or Missing Route alarm is generated.

When the AGV arrives to pick-up the drum from the Drum Infeed Conveyor B, the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer from the infeed conveyor B to the AGV is complete, indicated by the loss of the AGV input handshake signal, the drum data is copied from the data table for the drum in the "Ready" position of the conveyor to the data table for the current deck of the AGV. The AGVCS informs the PCS of the current deck the AGV is using when the AGV arrives at the pick-up / drop-off location and sends the Location of AGV System message (Netcom 5.6.2 to the PCS. The "Drum Present bit" for the "Ready" position's data table is cleared, to indicate that the drum is no longer on the conveyor. At the same time, the file also issues a Release AGV message (Netcom 5.5.9) to the AGVCS.

5.2.4 Local Control Unit 101 Program File 15: Drum Storage Carousel

The Drum Storage Carousel is used as a buffer to store production and verification drums awaiting transport to Shipping/Receiving and NDE/NDA workstations.

This file handles the interface between the PCS and the carousel and also manages all drum PINs and the associated data for drums stored in the carousel.

Communications between the PLC and the Drum Storage Carousel is accomplished via the Data Highway Plus link (DH+, an Allen-Bradley RS-485 serial multi-drop network). DH+ allows a PLC to read and write data directly to the memory of another PLC.

The file communicates with the carousel through the Data Highway Plus connection via MSG (Message) instructions. MSG instructions are used to read status bits from the carousel and to write the drum PINs and commands (Retrieve Drum or Store Drum) to memory locations in the carousel PLC.

For drums stored in the carousel, drum data (i.e. route, weight, status) is stored separately from the drum PINs. This allows the drum PINs to be correctly displayed by RTAP. Drums are related to data via index numbers. For each position in the drum PIN queue display (process

drums only, no QC drums), there is an index number assigned. The index numbers associate each drum PIN with the data for that drum.

When a drum is transferred to the carousel from the AGV, the data for that drum is transferred from the data table for the current deck of the AGV into the Carousel data table and a Release AGV message (Netcom 5.5.9) is sent to the AGVCS. When the drum is stored in the carousel, the drum PIN is copied into the next position in the appropriate queue. The drum queues are based on the next destination for the drum. The index number for that position in the queue is attached to the drum data. The new data record (index number plus drum data) is then stored in the next position of the drum data table. When the drum moves position within the display queue, its index number changes. The drum data index number is also changed to reflect the drum's new position within the display queue.

When a drum is stored into the carousel, the Container Location Update message (Netcom 5.3.1) is generated for the drum PIN with N_NCRSL as the location. The Location of AGV System message (Netcom 5.6.2), issued by the AGVCS when the AGV arrived at the carousel to drop-off the drum indicates where the drum was picked up. The location where the drum was picked-up and the drum process route are used to determine the drum's next destination and therefore the queue into which the drum PIN is stored.

If the drum is bound for an NDE or Passive-Action Neutron (PAN) vault, the drum PIN is stored into the next position of the appropriate queue and the drum's data is stored as described above. The file issues the AGV Transport Command message (Netcom 5.5.3) to pick-up the drum at the carousel and request a drop-off of the drum at an NDE (or PAN) vault.

If the drum is bound for the Discharge Conveyor, the drum PIN is stored in the next position of the discharge queue and the drum data is also stored. The PCS maintains a "Discharge Positions Available" variable to control AGV drum transfers to the Discharge Conveyor and to prevent over-loading of the conveyor. If the Discharge Conveyor is empty, the positions available variable is set to (4), meaning that (4) drums can be transferred to the conveyor. Whenever an AGV Transport Command is issued to pick up a drum (from the Carousel, the Airlock Conveyors, or a GEA vault) and request a drum drop-off at the Discharge Conveyor, the positions available variable is decremented. When a drum is indexed from the Discharge Conveyor to the Drum Scale Conveyor B, the positions available variable is incremented. If there is at least (1) discharge position available and there is a drum in the discharge queue of the carousel, the file AGV Transport Command message (Netcom 5.5.3) is issued to pick up the drum at the Carousel and request a drop-off of the drum at the Discharge Conveyor. At the same time, the "Discharge Positions Available" variable is decremented. If there is more than one drum in the discharge queue, the file issues an AGV Transport Command for each drum, as discharge positions become available.

If the drum is bound for the Process Area, the drum PIN is stored into the next position of the airlock queue and the associated drum data is stored. Depending on the process route of the drum, the drum PIN is also stored into the Airlock Low Level Waste (LLW) or Transuranic (TRU) drum PIN table. As with the discharge conveyor, the PCS maintains an "LLW Positions

Available" variable and a "TRU Positions Available" variable. There is a maximum of (3) positions available for each of the LLW and TRU lines. Each variable is respectively decremented when an AGV Transport Command is issued to pick-up a LLW or TRU drum from either the Carousel or a GEA vault and drop-off the drum at the Airlock Conveyors. The variables are incremented when a drum is removed from the LLW or TRU Entry Glovebox Lift Table. If there is at least (1) LLW position available and there is an LLW drum in the carousel airlock queue, the file issues an AGV Transport Command message (Netcom 5.5.3) to pick-up the drum at the Carousel and drop-off of the drum at the airlock Conveyors. At the same time, the file decrements the "LLW Positions Available" variable. If there is more than one LLW drum in the airlock queue, the file issues an AGV Transport Command for each LLW drum as LLW positions become available. TRU drums stored into the airlock queue of the carousel are processed similarly.

When the AGVCS has determined that its next task is to pick-up a drum at the Carousel and drop it off at its destination, it issues an AGV Transport Command message (Netcom 5.6.7) to the PCS. The drop-off location (contained in the AGV message) is used to determine from which queue the drum is retrieved. For all carousel queues except the airlock queue, the first (and oldest) drum PIN in the queue is sent to the carousel with the command to retrieve the drum. If the destination of the drum is the airlock conveyors, the file searches through the airlock queue for the drum PIN (contained in the AGV message). If the drum is found in the airlock queue, the drum PIN is sent to the carousel with the command to retrieve the drum. If the drum PIN is not found in the airlock queue, the "Airlock PIN Not Found" alarm is generated.

When the carousel indicates that the drum has been retrieved for pickup by the AGV, the drum PIN is copied from its PIN table into the Carousel Transfer data table and the drum data is retrieved (based upon the index number of the drum) and copied into the Carousel Transfer data table. When the PIN and data are copied to the Carousel Transfer data table, the remaining PINs in the PIN table and the remaining records in the data table are shifted up. When the carousel indicates that the drum has been transferred to the AGV, the drum data is copied from the Carousel Transfer data table to the data table for the current deck of the AGV. At this time, the file issues an AGV Transport Command message (Netcom 5.5.3) to drop-off of a drum at the Carousel and a Release AGV message (Netcom 5.5.9).

Operators can run QC checks with either QC drum through any or all of the assay vaults as selected on the RTAP pop-up. The routing order is fixed as PAN A, GEA A, PAN B, GEA B, and back to the carousel, but only those vaults selected are used.

Operators may also delete a drum from one of the processing queues (no QC drums) for a drum that has been manually removed from the carousel. When the operator selects a drum to delete from the RTAP display, the file deletes the drum PIN from its queue, deletes the drum's data from the data table, and decrements the queue and data pointers. The file also issues an AGV Transport Command message (Netcom 5.5.3) to drop-off of a drum at the Carousel.

If the Carousel is not in Remote mode, as indicated by the Carousel Remote Mode Status bit, all carousel processing logic is bypassed.

5.2.5 Local Control Unit 101 Program File 16: NDE/NDA Transfer Conveyors

The Transfer Conveyors are used to transfer the drums between the NDE/NDA area AGV and the NDE/NDA vaults.

This file controls the NDE/NDA area transfer conveyors:

Table 5-1. NDE/NDA Transfer Conveyors

Name	Tag	Name	Tag	Name	Tag
NDE A	CV-09-101A	PAN A	CV-09-101C	GEA A	CV-09-101E
NDE B	CV-09-101B	PAN B	CV-09-101D	GEA B	CV-09-101F

When the AGV arrives to drop-off a drum at a vault, the transfer proceeds according to the AGV IRCOM sequence. The drum data is transferred from the data table for the current deck of the AGV into the vault data table and the vault "Drum Present" bit is set. The AGV table is cleared, to indicate that the drum is no longer on the AGV. At the same time, the file issues a Release AGV message (Netcom 5.5.9) and a Container Location Update message (Netcom 5.3.1) with the vault as the location.

When the examination/assay is complete, the file issues an AGV Transport Command message (Netcom 5.5.3) to pick-up the drum at the vault and request a drop-off of the drum at its next destination. When the AGV pick-up commands are issued at one of the GEA vaults, the process route contained in the vault data table is used to determine the drum destination. If the destination is either the Discharge Conveyor or the Airlock Conveyors, the file checks the appropriate positions available variable. If there is at least (1) position available, the file requests a drop-off at the destination and then decrements the positions available variable. If there are no positions available, the file requests a drop-off at the Carousel, where the drum is stored until a position is available. For routing of Background and Verification (QC) drums, the file checks the process route at the PAN and GEA vaults before issuing the AGV pick-up command.

When the AGV arrives to pick-up a drum from a vault, the transfer again proceeds according to the AGV IRCOM sequence. The drum data is transferred from the vault data table to the drum data table for the current deck of the AGV. The "Drum Present bit" in the vault data table is cleared, to indicate that the drum is no longer in the vault. At the same time, the file issues a Release AGV message (Netcom 5.5.9) and an AGV Transport Command message (Netcom 5.5.3) to drop-off of a drum at the vault.

5.2.6 Local Control Unit 101 Program File 17: Background Drum Storage Conveyors

The Background Drum Storage Conveyors are used to store the background test drums until they are needed to test the NDA stations. This file controls the Background Drum storage conveyors.

Background drum routing can be configured via RTAP. Each background drum can be independently selected and routed through any or all of the vaults including PAN, GEA and NDE. Each drum is used for a single set of vaults. The background A drum is only used for the A vaults, and the background B drum is only used for the B vaults.

When the AGV arrives to pick-up a drum at a background conveyor, the transfer proceeds according to the AGV IRCOM sequence. The drum data is transferred from the background conveyor data table to the data table for the current deck of the AGV. The "Drum Present bit" for the background conveyor data table is cleared, to indicate that the drum is no longer on the conveyor. The file also issues a Release AGV message (Netcom 5.5.9) and an AGV Transport Command message (Netcom 5.5.3) to drop-off a drum at the background conveyor.

When the AGV arrives to drop-off a drum at a background conveyor, the transfer proceeds according to the AGV IRCOM sequence. The drum data is transferred from the data table for the current deck of the AGV into the background conveyor data table when the drum transfer from the AGV is complete, indicated by the activation of the back-side drum position switch. The "Drum Present bit" is cleared to indicate that the drum is no longer on the AGV. The file issues a Container Location Update message (Netcom 5.3.1) for the drum PIN with the conveyor (BDCVYR_A or BDCVYR_B) as the location and a Release AGV message (Netcom 5.5.9).

5.2.7 Local Control Unit 101 Program File 18: Empty Drum Infeed Conveyor

The Empty Drum Infeed Conveyor is used to accumulate newly received empty drums in the Shipping/Receiving area while awaiting transport to the process area. This file controls the Empty Drum Infeed Conveyor including the AGV IRCOM sequence and bar code operations.

When a drum PIN is scanned after the EMPINFDCVR bar code has been scanned and received, the file verifies that the drum PIN is valid. A "valid" drum pin must have been previously stored in the Empty Drum Storage area. The file checks to see where the last drum was placed on the conveyor (at the crane-end or the AGV-end). If the drum PIN is valid, operations may continue. If the drum PIN is invalid (the drum PIN was not found in the Empty Drum Storage area data table), the Drum PIN Mismatch alarm is generated for either the crane-end or AGV-end of the conveyor, depending upon where the last drum was placed on the conveyor.

If the last drum was placed at the crane-end of the conveyor (normal operation), and the drum PIN is valid, the PIN is stored in the next position of the bar code drum PIN table and is

also placed in the first position (crane-end) of the Empty Infeed Conveyor data table. When the operator pushes the "Index" pushbutton to index the drum forward one position, the drum data in the conveyor drum data tables are shifted up by one position and the file issues a Container Location Update message (Netcom 5.3.1) with EMPINFDCVR as the location.

If the last drum was placed at the AGV-end of the conveyor (reverse operation), and the drum PIN is valid, the PIN is stored in the next position of the bar code drum PIN table and also in the ninth (AGV-end position) of the conveyor drum PIN table. The file also sends a Container Location Update message (Netcom 5.3.1) with the EMPINFDCVR location.

After the Container Location Update message is sent for a drum PIN on the conveyor, the DMS responds with the Empty Drum Process Route message (Netcom 5.4.15), which contains a drum PIN and its associated process route. When this message is received, the file searches for the drum PIN in the conveyor drum PIN table. If the drum PIN is found, the process route is transferred to the conveyor data table for the position on the conveyor in which the drum PIN was found. If the drum PIN is not found in the conveyor drum PIN table, the "Empty Drum Process Route Drum Not Found" alarm is generated.

When the operator issues an AGV pick-up command from the RTAP display, the file verifies that the AGV Pick-up Enable Switch is set to "Enable". If AGV pick-ups are not enabled, no AGV pickups are initiated. The file verifies that there is a drum at the "Ready" position (AGV-end) of the conveyor. If there is no drum at the "Ready" position, the "Drum Not at Ready Position" alarm is set. The file verifies that the process route for the drum at the "Ready" position is valid. If the route is invalid, the "AGV Pick-up Bad" or "Missing Route" alarm is set. If all the above conditions are met, the file issues an AGV Transport Command message (Netcom 5.5.3) to pick-up the drum at the Empty Infeed Conveyor and request a drum drop-off at the Airlock Conveyors.

When the AGV arrives to pick-up a drum at the Empty Drum Infeed Conveyor, the transfer proceeds according to the AGV IRCOM sequence. The drum data is transferred from the data table for the drum at the "Ready" position of the conveyor to the data table for the current deck of the AGV. This transfer occurs when the drum transfer is complete, indicated by the loss of the AGV input handshake signal. The "Drum Present bit" for the conveyor position #9 data table is cleared, to indicate that the drum is no longer on the conveyor. The file also issues a Release AGV message (Netcom 5.5.9). The drum data in the conveyor drum data tables for the remaining drums on the conveyor is then shifted up by one position.

5.2.8 Local Control Unit 101 Program File 19: Drum Discharge Conveyor

The drum discharge conveyor is the conveyor before drum scale conveyor B. Drums are indexed onto the drum discharge conveyor from the AGV and then moved to the drum scale conveyor B where they are weighed and then manually removed from the conveyor.

When the AGV arrives to drop-off a drum at the Discharge Conveyor, the drum transfer proceeds according to the AGV IRCOM sequence. After the drum has passed in front of the Discharge Conveyor Full switch, the drum transfer is considered complete. The file then issues a Release AGV message (Netcom 5.5.9) and copies the drum data from the data table for the current deck of the AGV to the data table for the next available position on the Discharge Conveyor. The "Drum Present bit" for the AGV is cleared, to indicate that the drum is no longer on the AGV. The file issues a Container Location Update message (Netcom 5.3.1) with DISCHCVR as the location.

After the operator has pushed the "Index" pushbutton to index a drum from the discharge conveyor to the drum scale conveyor B and a drum is sensed on the scale conveyor, the drum data is transferred from the drum data table for the drum in the "Ready" position (position #4) of the discharge conveyor to the drum data table for the scale conveyor. The drum data for the remaining drums on the discharge conveyor is shifted up by one position. The file issues an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a drop-off of a drum at the Discharge Conveyor.

5.2.9 Local Control Unit 101 Program File 20 Shipping/Receiving/Nondestructive Examination/Nondestructive Assay Supervisory Control

This file is responsible for shipping/receiving/NDE/NDA isolation door control. This includes tracking AGV status and location, tracking data for drums currently on the NDE/NDA AGV, and routing messages between LCU 101 files and other devices on the Local Area Network (LAN) via NETCOM.

The supervisory control file is the interface between the other files of the PLC and Netcom. When a file issues a Netcom message to a device on the LAN, it copies the message data into the Netcom message Transmit buffer and sets a trigger to notify the supervisory control file that a message is ready to transmit. The supervisory control file then increments an index number (unique to every message transmitted to Netcom) and then sends the message using the PLC Message command.

When Netcom transmits a message, Netcom determines which PLC the message is destined for and then copies the message data into the appropriate PLC's Netcom message Receive buffer. Netcom sets a flag to notify the PLC's supervisory control file that a new message has arrived. The supervisory control file then examines the message data to determine for which file within the PLC the message is destined, and then sets a flag to trigger the destination file to process the message.

Some messages that arrive in the PLC are not bound for any particular file, but rather are shared by various files. In these cases, the supervisory control file copies the message data into a buffer for the specific message and, in some cases, trigger appropriate logic.

For example, the receipt of either a Fissile Inventory Level message with the Alarm Existing field set to "T" or a Criticality Alert message from the DMS stops all container movement within the facility. In this case, the supervisory control file sets a bit to stop all conveyor movement controlled by the PLC's files and also triggers the NDE_NDA file to send abort exam messages to the LAN devices it interfaces with. This condition also triggers the supervisory control file to issue a Disable All AGV Movement message (Netcom 5.5.6) to the AGVCS for the NDE/NDA AGV.

5.2.10 Local Control Unit 101 Program File 25: Nondestructive Examination/Nondestructive Assay

5.2.10.1 Drum X-Ray.

There are two drum NDE stations, East (A) and West (B), which include an examination vault and a transfer conveyor. This file controls the NDE vaults and the Transfer Conveyors file (File 16) controls the transfer conveyors.

The stations are interfaced using discrete I/O points. The drum data is transferred into and out of the drum data tables as part of transfer conveyor operations. Operators are allowed to edit the drum data on the NDE A/B RTAP displays.

5.2.10.2 Drum Passive/Active Neutron.

There are two drum PAN stations, East (A) and West (B), which include an assay vault and a transfer conveyor. This file controls the PAN vaults and the Transfer Conveyors file (File 16) controls the transfer conveyors.

The PAN system is connected to the WRAP LAN. All communications with the PAN equipment is accomplished via NETCOM.

The drum data is transferred into and out of the drum data tables as part of the Transfer Conveyors operations. The operator is allowed to edit the drum data on the PAN A/B RTAP displays.

After the drum has been transferred into the vault, the vault sends a Request Neutron Pulse for Strike Shape Validation message (Netcom 5.12.4), which prompts the operator to initiate the strike shape. When the operator pushes the "Ready to Observe" pushbutton on the RTAP display, the file issues a Ready to Observe Strike Shape, Initiate Neutron Pulse message (Netcom 5.11.6) to the vault. After the operator has observed the pulse and determined its quality, he should select either GOOD or BAD and then push the APPLY pushbutton, which triggers the file to issue either a Neutron Pulse Strike Shape Good message (Netcom 5.11.7) or a Neutron Pulse Strike Shape Bad message (Netcom 5.11.8) to the vault.

If the operator pushes the "Abort Exam" pushbutton on the RTAP display, or if a Fissile Inventory Level alarm or a Criticality Alert has been received from the DMS, the file issues an Abort PAN Assay message (Netcom 5.11.2) to the vault.

5.2.10.3 Drum Gamma Energy Analysis.

There are two drum Gamma Energy Analysis (GEA) stations, East (A) and West (B), which include an assay vault and a transfer conveyor. This file controls the GEA vaults and the transfer conveyors file (File 16) controls the transfer conveyors.

The GEA system is connected to the WRAP LAN. All communications with the GEA equipment is accomplished via NETCOM.

The drum data is transferred into and out of the drum data tables as part of transfer conveyors operations. Operators are allowed to edit the drum data on the GEA A/B RTAP displays.

If the operator pushes the "Abort Exam" pushbutton on the RTAP display, or if a Fissile Inventory Level alarm or a Criticality Alert has been received from the DMS, the file issues an Abort GEA Assay message (Netcom 5.13.2) to the vault.

5.2.10.4 Boxed Waste Assay.

This file handles the interface between the PCS and the Boxed Waste Assay (BWAS) equipment and also the associated bar code operations.

The BWAS system is connected to the WRAP LAN. All PCS communications with the BWAS equipment are accomplished via NETCOM.

If the operator pushes the "Abort Exam" pushbutton on the RTAP display, or if a Fissile Inventory Level alarm or a Criticality Alert is received from the DMS, the file issues an Abort BWAS message (Netcom 5.3.27) to the DMS.

5.2.10.5 Box Nondestructive Examination.

This file controls the Box NDE equipment including the box transfer conveyor.

When the operator pushes the "Ready to Send Box" pushbutton and the Box NDE vault is ready to accept a box, the file sends a "Ready to Send Box" signal to the vault. When the vault responds with a "Start Box Conveyor Forward" signal, the file runs the Box Transfer Conveyor forward until the vault sends the signal that the box presence is sensed inside the vault. When the operator chooses to close the vault door, the file sends the "Close Vault Door Enabled" signal to the vault until the door is closed.

When the Box NDE vault signals that the exam is complete, the file runs the Box Transfer Conveyor in reverse and send the "Ready to Pick-up Box From Vault, Conveyor Started" signal to the vault until the box has been fully transferred to the conveyor, at which time the file sends the "Box Out; Stop Internal Conveyor" signal to the vault.

5.3 LOCAL CONTROL UNIT 102

The files in 104-CNR-12-102 (LCU 102) control the LLW processing lines of the Process Area of WRAP 1, including the LLW Lift Tables, the LLW Entry, Sorting, Compactor, Exit and Restricted Waste Management (RWM) Gloveboxes. These files also control the Airlock Conveyors and the PLC interface to the RWM Carousel.

5.3.1 Local Control Unit 102 Program File 30: Airlock & Transfer Conveyors

The Airlock & Transfer Conveyors are used to transfer the drums between the Process Area and the NDE/NDA area. Operation of the airlock systems can be in either automatic, remote manual, or local manual mode. This file handles all operations for the doors and conveyors for both airlock systems including automatic and remote manual modes and AGV messaging.

In auto mode, this file moves the drums through the airlocks automatically. There are two automatic conveyor directions defined for each conveyor, ***forward*** and ***reverse***. These modes are set via the RTAP display for each conveyor line and can be set independently. In forward auto mode, the "A" conveyors move drums from the NDE/NDA area into the Process area and the "B" conveyors move drums from the Process area into the NDE/NDA area. Reverse auto mode moves the drums in the opposite directions.

In remote manual mode the operator has control over the airlock systems from the RTAP display. This file ensures that safety interlocks are in place during remote manual mode.

Local manual mode is accomplished at the airlocks with local control equipment and completely bypasses the PCS.

The sequence of operations assumes that both conveyor lines are set to Forward Auto Mode. In the case where a conveyor line is set to Reverse Auto Mode, the conveyor's operation is identical to the forward auto mode for the other conveyor line. (In other words, "B" conveyor's Reverse Auto Mode operation is identical to "A" conveyor's Forward Auto Mode.) This file notifies the AGVCS of the current status and direction of each conveyor line, whenever the mode or direction of a conveyor line is changed, by sending an Airlock Conveyor Status message (Netcom 5.5.11) to the AGVCS.

When the NDE/NDA area AGV arrives to drop-off a drum at conveyor CV-09-103A (for transfer into the Process area), the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer is complete, indicated by the drum activating the door-side position switch of CV-09-103A, the data from the NDE/NDA AGV drum data table is read from LCU 101 into the "mirrored" AGV drum data table in LCU 102. When the data read is complete, the drum data for the drum is transferred from the "mirrored" drum data table for the current deck of the AGV to the drum data table for conveyor CV-09-103A, the "Drum Present bit" in the "mirrored" table is unlatched, and the data is sent back to LCU 101 to update the master NDE/NDA AGV drum data table. At the same time, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PIN with AIRCVYR_A1 as the location and a Release AGV message (Netcom 5.5.9) to the AGVCS. Tripping of the door-side position switch also triggers Door 18 to raise.

When Door 18 is raised, the drum is transferred to conveyor CV-09-104A until the process-side position switch of CV-09-104A is activated, which triggers Door 18 to close and also causes the transfer of the drum data from the CV-09-103A drum data table to the CV-09-104A drum data table and the "Drum Present bit" for the CV-09-103A data table is cleared, to indicate that the drum is no longer on the conveyor. At the same time, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PIN with AIRCVYR_A2 as the location and an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a drop-off of a drum at airlock conveyor CV-09-103A.

When Door 18 is closed, Door 18A opens and, when it is open, the drum is transferred to conveyor CV-09-201A until the AGV-side position switch of CV-09-201A is activated, which triggers Door 18A to close and also causes the transfer of the drum data from the CV-09-104A drum data table to the CV-09-201A drum data table and the "Drum Present bit" for the CV-09-104A data table is cleared, to indicate that the drum is no longer on the conveyor. At the same time, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PIN with AIRCVYR_A3 as the location and an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a pick-up of the drum at conveyor CV-09-201A and request a drop-off of the drum at its destination, which is determined by the drum's process route

When the Process area AGV arrives at conveyor CV-09-201A to pick-up the drum, the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer is complete, indicated by the loss of the AGV input handshake signal, the drum data is transferred from the CV-09-201A drum data table to the drum data table for the current deck of the Process area AGV; also, the "Drum Present bit" for the conveyor data table is cleared, to indicate that the drum is no longer on the conveyor. At the same time, the file issues a Release AGV message (Netcom 5.5.9) to the AGVCS.

When the Process area AGV arrives to drop-off a drum at conveyor CV-09-201B (for transfer into the NDE/NDA area), the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer is complete, indicated by the drum passing the AGV-side position switch CV-09-201B, the drum data is transferred from the drum data table for the current deck of the AGV to the drum data table for conveyor CV-09-201B; also, the "Drum

Present bit" for the AGV data table is cleared, to indicate that the drum is no longer on the AGV. At the same time, the drum weight is read from the weight transmitter, and then the file issues a Container Location with Weight message (Netcom 5.3.2) to the DMS for the drum PIN with AIRCVYR_B1 as the location and a Release AGV message (Netcom 5.5.9) to the AGVCS. After surveying the drum for radiation, the operator moves the drum to the door-side of the conveyor, so that the door-side position switch is activated, using local conveyor controls, and then returns the conveyor to remote mode.

When the conveyor is returned to remote mode and the drum is activating the door-side position switch of CV-09-201B, Door 17A raises. When Door 17A is raised, the drum is transferred to conveyor CV-09-104B until the NDE/NDA-side position switch of CV-09-104B is activated, which triggers Door 17A to close and also causes the transfer of the drum data from the CV-09-201B drum data table to the CV-09-104B drum data table and the "Drum Present bit" for the CV-09-201B data table is cleared, to indicate that the drum is no longer on the conveyor. At the same time, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PIN with AIRCVYR_B2 as the location and an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a drop-off of a drum at airlock conveyor CV-09-201B.

When Door 17A is closed, Door 17 opens and, when it is open, the drum is transferred to conveyor CV-09-103B until the AGV-side position switch of CV-09-103B is activated, which triggers Door 17 to close and also causes the transfer of the drum data from the CV-09-104B drum data table to the CV-09-103B drum data table and the "Drum Present bit" for the CV-09-104B data table is cleared, to indicate that the drum is no longer on the conveyor. At the same time, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PIN with AIRCVYR_B3 as the location and an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a pick-up of the drum at conveyor CV-09-103B and request a drop-off of the drum at its destination, which is determined by the drum's process route.

When the NDE/NDA area AGV arrives at conveyor CV-09-103B to pick-up the drum, the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer is complete, indicated by the loss of the AGV input handshake signal, the current AGV drum data table is read from LCU 101 into the "mirrored" drum data table in LCU 102. When the data read is complete, the drum data is transferred from the CV-09-103B drum data table to the "mirrored" drum data table for the current deck of the NDE/NDA area AGV and the "Drum Present bit" for the conveyor drum data table is cleared, to indicate that the drum is no longer on the conveyor. The updated "mirrored" AGV data table is then transferred to LCU 101 to update the master AGV drum data table. At the same time, the file issues a Release AGV message (Netcom 5.5.9) to the AGVCS.

5.3.2 Local Control Unit 102 Program File 31: LLW and LLW RWM Lift Tables

The LLW Lift Tables are used to transfer the drums to/from the Process Area AGV into and out of the LLW Process Gloveboxes. The lift tables in Table 5-2 are controlled by this file.

Table 5-2. LLW and LLW RWM Lift Tables

107-LT-09-201D	LLW RWM Drum Lift Table (Non-Compliant Loadout)
107-LT-09-201E	LLW RWM Drum Lift Table (Compliant Loadout)
107-LT-09-201F	LLW RWM Drum Lift Table (Bagless Transfer Port)
107-LT-09-202A	LLW Drum Lift Table (Entry Port)
107-LT-09-202C	LLW Drum Lift Table (Exit Port)
107-LT-09-203A	LLW Drum Lift Table (RWM Transfer Port)

When the AGV arrives to drop-off a drum at a lift table, the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer is complete, indicated by the drum passing the AGV-end position switch of the lift table conveyor, the drum data is transferred from the drum data table for the current deck of the AGV to the drum data table for the current lift table and the file then issues a Release AGV message (Netcom 5.5.9) to the AGVCS. The "Drum Present bit" for the AGV is cleared, to indicate that the drum is no longer on the AGV. Operations to mate the drum to the port may then proceed.

After drum processing is complete, an operator initiates an AGV pickup by pressing a button on the Operator Interface Unit (OIU). To initiate the AGV pickup, the drum must be at the AGV-end of the lift table and the lift table must be at AGV height. In addition, the Maintenance/Off/Normal switch must be turned to "Normal" and the AGV/Panel switch must be turned to "AGV" for the pickup to be initiated.

As part of the drum exit sequence, the file issues an AGV Transport Command message (Netcom 5.5.3) to pick-up the drum at the lift table and drop-off the drum at its destination. In addition, the process route of the drum is set for drums on the LLW Entry, LLW Exit and the LLW RWM Exit lift tables as follows: LT-09-202A, process route = 103 if the drum is clean, LT-09-202C, process route = 102, and LT-09-201D, process route = 101.

When the AGV arrives at a lift table to pick-up a drum, the drum transfer proceeds according to the AGV IRCOM sequence. Once the transfer is complete, indicated by the loss of the AGV input handshake signal, the drum data is transferred from the lift table data table to the data table for the current deck of the AGV. The "Drum Present bit" for the lift table data table is cleared, to indicate that the drum is no longer on the lift table. The file also issues a Release AGV message (Netcom 5.5.9) and an AGV Transport Command message (Netcom 5.5.3) to drop-off of a drum at the lift table.

Because the lift tables (for raise and lower operations) are controlled via the Sercom serial link, all LLW lift tables MUST be connected and powered on for any lift table raise or

lower operations to be executed. If a lift table has been powered down, the lift table servo motor needs to be re-homed prior to use.

5.3.3 Local Control Unit 102 Program File 34: Restricted Waste Management Drum Carousel

The RWM Drum Carousel is used as a buffer for waste drums awaiting processing, RWM drums awaiting sample analysis, and empty drums awaiting access to process gloveboxes. This file handles the interface between the PCS and the carousel and also manages the drum PINs and the associated data for the drums stored in the carousel.

Communications between the PLC and the Drum Storage Carousel is accomplished via the Data Highway Plus (DH+ = an Allen-Bradley RS-485 multi-drop network implementation) link. DH+ allows a PLC to read and write data directly to the memory of another PLC. The memory locations being accessed in the Carousel PLC are listed in the SDD of the Carousel.

The drum PINs for the drums stored in the carousel are kept in tables separate from their respective drum data (i.e. route, weight, status), which is stored in the data table, to allow displaying the drum PINs in each queue on the RTAP display. Each drum, therefore, is related to its data through the use of index numbers. For each position in the drum PIN queue there is an index number assigned. The index numbers are used to associate the drum PINs with their data.

When the carousel indicates to the file that the drum has been transferred to the carousel from the AGV, the drum data (PIN, weight, route and status) is transferred from the data table for the current deck of the AGV into the RWM Carousel data table. The file then issues a Release AGV message (Netcom 5.5.9). When the carousel informs the file that the drum is stored, the drum PIN is copied into the next position in the appropriate queue (based upon the next destination for the drum) and the index number for the position in the drum PIN queue display in which the drum PIN now resides is attached to the data for the drum (weight, route and status). The new data record (index number plus drum data) is then stored in the next position of the Carousel data table. When the drum moves position in the table, either within its queue or to another queue, its index number changes, and so the index number for its data is also changed to reflect the drum's new position within the drum PIN queue display.

When a drum is stored into the carousel, the file issues a Container Location Update message (Netcom 5.3.1) with RWM_CRSL as the location. The file also examines where the drum was picked-up (obtained from the Location of AGV System message, Netcom 5.6.2) and the process route of the drum to determine the drum's next destination and therefore the queue into which the drum PIN is stored in the RWM Carousel data table.

If the drum is bound for the TRU or LLW Entry Glovebox, the drum PIN is stored into the next position of the appropriate queue and the drum's data is stored as described above. The file also issues an AGV Transport Command message (Netcom 5.5.3) to pick-up the drum at the

RWM Carousel and request a drop-off of the drum at the TRU (LLW) Entry Glovebox Lift Table.

If the drum was picked-up at either the TRU or LLW Entry Glovebox Lift Table, the drum is bound for one of the two LLW exit lift tables (LLW Exit Glovebox, LT-09-202C, or the LLW RWM Glovebox, LT-09-201D), and the drum PIN is stored into the next position of the LLW GEN EXIT queue (Category "C") and the drum's data is stored . The file issues an AGV Transport Command message (Netcom 5.5.3) to pick-up the drum at the RWM Carousel and request a drop-off of the drum at either of the LLW exit lift tables (location = LLW_GENEXIT).

If the drum was picked-up at either the TRU (or LLW) RWM Transfer Port Lift Table (LT-09-203B or LT-09-203A), the drum is bound for the TRU (or LLW) RWM Glovebox Entry Lift Table (LT-09-201C or LT-09-201F) for sampling and the drum PIN is stored into the next position of the TRU (or LLW) Sampling queue (Category "D2" or "D5") and the drum's data is stored in the RWM Carousel data table.

If the drum was picked-up at either the TRU (or LLW) RWM Glovebox Entry Lift Table (LT-09-201C or LT-09-201F), the drum is bound for the same lift table for processing and the drum PIN is stored into the next position of the TRU (or LLW) Processing queue (Category "D3" or "D6") and the drum's data is stored in the RWM Carousel data table.

After a drum has been stored into one of the sampling or processing queues (Categories "D2", "D3", "D5" and "D6"), the operator determines when the drum is ready for transfer to the RWM glovebox and changes the status of the drum to "Ready" using the RTAP display. When the operator is ready to transfer a drum to one of the RWM gloveboxes, he issues an AGV pick-up command for a drum in one of the TRU or LLW Sampling or Processing queues by making the appropriate selection using the RTAP display. This triggers the file to search through the selected queue for the first drum with a "Ready" status. If a drum with a "Ready" status is found, the file issues an AGV Transport Command message (Netcom 5.5.3) to pick-up the drum from the RWM Carousel and request a drop-off of the drum at its destination (TRURWENTRY or LLWRWENTRY). If a drum with a "Ready" status is not found in the selected queue, the "No 'Ready' Status Drums in Category" alarm is set.

When a drum has been stored into one of the processing queues (Categories "D3" or "D6"), the operator determines if the drum is empty and ready for transfer to one of the RWM transfer ports at the sorting gloveboxes (TRU or LLW). If the drum is ready for transfer, the operator selects the drum PIN and select "Move To Transfer" to move the drum PIN to the TRU or LLW Transfer queue (Category "D1" or "D4"); at this time the file moves the drum PIN by "retrieving" the PIN from the processing queue and "retrieving" its data from the data table (based upon the index number of the drum) to the RWM Carousel Transfer Conveyor drum data table and then storing the PIN from the transfer conveyor data table to the next position of the transfer queue and storing the data in the next position of the data table, as described above. The file also issues an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a pick-up of the drum from the RWM Carousel and request a drop-off of the drum at its destination (TRU_RWMPRT or LLW_RWMPRT).

When the AGVCS has determined that its next task is to pick-up a drum at the RWM Carousel and drop it off at its destination, it issues an AGV Transport Command message (Netcom 5.6.7) to the PCS. This file uses the drop-off location (contained in the AGV message) to determine from which queue the drum will be retrieved. For all carousel queues except the sampling and processing queues (Categories "D2", "D3", "D5" and "D6"), the first (and oldest) drum PIN in the queue is sent to the carousel with the command to retrieve the drum. If the drum is to be retrieved from the one of the sampling or processing queues, the file searches through the queue for the first drum with a "Ready" status. If the drum is found in the queue, the drum PIN is sent to the carousel with the command to retrieve the drum. If the drum PIN is not found in the queue, the "No 'Ready' Status Drums in Category" alarm is set.

When the carousel informs the file that the drum has been retrieved for pickup by the AGV, the PIN is copied from its PIN table into the RWM Carousel Transfer Conveyor drum data table and the drum data is retrieved (based upon the index number of the drum) and copied into the conveyor table as well. When the PIN and data are copied to the transfer conveyor table, the remaining PINs in the PIN table and the remaining records in the data table are shifted up. When the carousel informs the file that the drum has been transferred to the AGV, the drum's data is copied from the Carousel Transfer Conveyor drum data table to the data table for the current deck of the AGV. At the same time, the file issues an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a drop-off of a drum at the RWM Carousel and a Release AGV message (Netcom 5.5.9) to the AGVCS.

The operator may also choose to delete a drum from one of the queues when a drum has been manually removed from the carousel. When the operator selects a drum to delete from the RTAP display, the file deletes the drum PIN from its queue, delete the drum's data from the data table and decrement the queue and data pointers. The file also issues an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a drop-off of a drum at the RWM Carousel.

Note that in order to ensure that all data is updated properly, the operator should avoid initiating another operation from the RTAP RW Carousel display until the previous operation has been completed.

5.3.4 Local Control Unit 102 Program File 40: Low Level Waste Entry Glovebox

The LLW Entry Glovebox is the first glovebox for the LLW process line. An 85-gallon overpack drum is mated to the LLW Entry Port and then a 55-gallon waste drum is removed from the overpack. Through a combination of operator and automatic operations, the drum is brought into the entry glovebox, tested for contamination, and moved into position on the drum transfer car for transfer into the sorting glovebox. The overpack is tested for contamination, re-lidded and sent to the RWM carousel or back to the airlock conveyors for transfer back to Shipping/Receiving.

After the drum is delivered to the LLW Entry Glovebox Lift Table (LT-09-202A), the drum data is transferred into the lift table data table and the file sends a Container Location Update message to the DMS (Netcom 5.3.1). The DMS responds with a Container Location Update message (Netcom 5.4.1). The file copies the drum PIN contained in the message (which is the drum PIN of the inner waste drum) to the LLW Entry Glovebox data table and set the Drum Present flag.

When the drum transfer port door is opened and the drum is placed on the drum transfer car, the drum data is transferred from the LLW Entry Glovebox drum data table to the LLW Sorting Glovebox Drum Transfer Car drum data table.

5.3.5 Local Control Unit 102 Program File 41: Low Level Waste Sorting Glovebox

The LLW Sorting Glovebox is the second glovebox in the LLW process line. A 55-gallon drum enters the sorting glovebox through the transfer port at the entry glovebox. Through a combination of operator and automatic operations, the drum is brought into the sorting glovebox, opened, and its contents are dumped onto the sorting table. The operator sorts the non-compliant items and places them into an RWM Transfer drum. The remaining items are returned to the original drum, the drum is re-lidded, and then moved to the compactor

When the drum is picked-up from the transfer car by the drum tipper and the "Raise with Grab Closed" sequence is complete, the drum data is transferred from the transfer car drum data table to the drum tipper drum data table and the file issues a Container Location Update message (Netcom 5.3.1) for the drum in the drum tipper. When the drum is lowered back onto the drum transfer car from the drum tipper and the "Open Grab and Park" sequence has been completed, the drum data is transferred from the drum tipper data table to the transfer car drum data table.

5.3.6 Local Control Unit 102 Program File 42: Low Level Waste Supercompactor Glovebox

The LLW Supercompactor is used to compact the compliant waste drums coming from the sorting glovebox. The 55-gallon waste drums arrive via drum transfer car from the sorting glovebox, are compacted, and then are transferred to the LLW Exit Glovebox.

The Supercompactor has its own controller and Operator Interface Unit. This file handles the interface between the PCS and the Supercompactor.

Communications between the PLC and the Supercompactor is accomplished via the Data Highway Plus (DH+ = an Allen-Bradley RS-485 multi-drop network implementation) link. DH+ allows a PLC to read and write data directly to the memory of another PLC.

5.3.7 Local Control Unit 102 Program File 43: Low Level Waste Exit Glovebox

The LLW Exit Glovebox is the final glovebox for the LLW process line. The 55-gallon drums, which were sorted in the LLW sorting glovebox to only contain low-level waste and then compacted into a puck by the Supercompactor are measured and weighed before being loaded into an overpack drum.

This file handles the control for the movement and storage of pucks within the glovebox, the mating of an overpack drum to the Entry/Exit port, and all bar code operations.

The LLW Exit Glovebox (107-GB-07-105) is used to transfer compacted drums to a 322 liter (85 gallon) overpack drum. The LLW Supercompactor (107-CM-07-107) transfers a drum puck to the exit conveyor. After a drum puck is transferred to the LLW Exit Glovebox, the following drum puck operations are possible:

1. Label Drum Puck with Barcode Pin
2. Pick up drum puck using the Drum Lifter (DH-07-104)
3. Place drum puck at storage location
4. Load drum puck into overpack drum

The operator uses the LLW Exit Glovebox Operator Interface Unit (OIU) 107-OIU-12-104C to control glovebox operations. The operator also receives glovebox status messages and other information from the OIU. The Hoist/Trolley Control Pendant (107-PC-07-004) is used to control hoist and hoist trolley movement (107-CR-07-104D) in the LLW Exit Glovebox.

The LLW Supercompactor transfers a drum puck to the exit conveyor. The operator attaches a new barcode label to the puck. The operator scans the puck barcode label using scanner NT-312. If the puck barcode label is successfully scanned, the puck pin will be displayed in the "COMPACT RECEIPT" box on the "TROLLEY MENU".

NOTE: The drum lifter (DH-07-104) weight scale should be zeroed out prior to each shift, or more frequently as required.

NOTE: Before picking up and moving any puck, the operator must visually verify that the puck barcode label matches the puck PIN displayed on the "TROLLEY MENU" for that position. If the label and the PIN do not match, all LLW Exit Glovebox operations must stop and the discrepancy must be resolved before operations can continue.

To pick up a drum puck, the operator must first move the hoist trolley to the desired position. The operator must then lower the hoist chain, open the drum lifter, securely grip the drum puck with the lifter, and then raise the lifter using the hoist/trolley pendant.

The operator can move the hoist only when the hoist chain is fully raised. The operator can move the hoist trolley by selecting from the following "TROLLEY MENU" position buttons:

A. COMPACT RECEIPT
B. STORAGE POSITION 1
C. STORAGE POSITION 2
D. LOAD OUT

The operator presses the button for the location desired, and if successful, the message "TROLLEY MOVING TO [POSITION NAME]..." is displayed on the "TROLLEY MENU". If an incorrect position is selected, the operator can select the correct position and the message "TROLLEY MOVING TO [POSITION NAME]..." should reflect the correct position. The operator then uses the hoist/trolley pendant left and right buttons to cause the hoist to move to the desired position. Once the trolley reaches the desired position, the message "TROLLEY AT [POSITION NAME]" message is displayed.

The hoist raise/lower function is disabled until the operator presses either "PICK UP PUCK" or "STORE PUCK". The operator should press "PICK UP PUCK" if a puck transfer from storage position to the drum lifter is desired. The operator should press "STORE PUCK" if a puck transfer from the drum lifter to a storage position is desired.

To transfer a puck to the drum lifter, a drum should be stored at the current trolley position and no drum should be held in the lifter. The operator must also verify that the "TROLLEY MENU" reflects this status. On the "TROLLEY MENU", the drum pin should be displayed in the current trolley position box, but not in the "DRUM LIFTER" box. For example, if the trolley is at the "COMPACT RECEIPT" position, the correct puck pin should be displayed in the "COMPACT RECEIPT BOX" the "DRUM LIFTER" box should be blank, with no puck pin displayed. The operator presses "PICK UP PUCK" and, if successful, the message "OPERATOR: PICK UP DRUM PUCK..." will be displayed on the "TROLLEY MENU". The operator then lowers and opens the compacted drum lifter using the hoist/trolley pendant, adjusts the drum lifter to firmly grip the puck, and then raises the drum lifter with puck until the hoist chain is fully raised. Because the weight scale measures the weight of the puck held in the lifter, the message "DRUM PUCK HELD BY LIFTER" should be displayed on the "TROLLEY MENU" and the puck pin that was displayed in the storage position box should now be displayed in the "DRUM LIFTER" box. The box for the storage position from which the puck was transferred should now be blank.

To store a drum puck, the operator must first move the hoist trolley to the desired position. The operator must then lower the hoist chain, open the drum lifter, release the drum puck from the lifter, and then raise the lifter using the hoist/trolley pendant.

The operator can move the hoist only when the hoist chain is fully raised. The operator can move the hoist trolley by selecting from the following "TROLLEY MENU" position buttons:

A. COMPACT RECEIPT
B. STORAGE POSITION 1
C. STORAGE POSITION 2

D. LOAD OUT

The operator presses the button for the location desired, and if successful, the message "TROLLEY MOVING TO [POSITION NAME]..." is displayed on the "TROLLEY MENU". The operator then uses the hoist/trolley pendant left and right buttons to cause the hoist to move to the desired position. Once the trolley reaches the desired position, the message "TROLLEY AT [POSITION NAME]" message is displayed.

The hoist raise/lower function is disabled until the operator presses either "PICK UP PUCK" or "STORE PUCK". The operator should press "PICK UP PUCK" if a puck transfer from storage position to the drum lifter is desired. The operator should press "STORE PUCK" if a puck transfer from the drum lifter to a storage position is desired.

NOTE: The PCS will allow the operator to store a puck at the Compact Receipt position, even if the PCS is already tracking a puck at that location. If this occurs, the information for the drum previously placed at the compact receipt will be overwritten by the new drum information.

To store a puck held by the drum lifter, no drum should be present at the current trolley position. The operator must verify that the "TROLLEY MENU" reflects this status. On the "TROLLEY MENU", the puck pin should be displayed in the "DRUM LIFTER" box and no puck pin should be displayed in the current trolley position box. For example, if the trolley is at the "STORAGE POSITION 1" position, the correct puck pin should be displayed in the "DRUM LIFTER" box and the "STORAGE POSITION 1" box should be blank, with no puck pin displayed. The operator presses "STORE PUCK" and, if successful, the message "OPERATOR: PLACE DRUM PUCK AT [POSITION NAME]..." will be displayed on the "TROLLEY MENU". The operator then lowers the compacted drum lifter using the hoist/trolley pendant, adjusts the drum lifter to releases the puck, and then raises the drum lifter. When the drum lifter is fully raised, the puck pin that was displayed in the "DRUM LIFTER" box should now be displayed in the current storage position box. The "DRUM LIFTER" box should now be blank.

To load out a drum puck, the operator must verify the drum puck pin, pick up the drum puck, weigh the drum puck, and press the "ADD TO CUMULATIVE" button on the "WEIGH MENU". The operator can then move the hoist trolley to the "LOAD OUT" position, place the puck in the load out drum, and fully raise the lifter without the drum puck.

The "WEIGH MENU" displays the following items related to drum puck loadout:

1. "COMPACT DRUM IN LIFTER"
   This box displays the pin for the drum puck that the PCS is currently tracking as being held by the drum lifter. If there is no drum puck held in the drum lifter, this box should be blank.

2. "COMPACT DRUM WEIGHT (Kg)"

This box displays the weight, in kilograms, of the drum puck currently held by the lifter. If the drum lifter is suspended without a puck, the weight should be 0.0 +/- 2 kilograms. If the weight of the empty, freely suspended drum lifter exceeds this range, the drum lifter weight scale should be zeroed.

3. "CUMULATIVE DRUM WEIGHT (Kg)"
This box displays the cumulative weight, in kilograms, of all drum pucks that have been placed in the loadout drum.

4. "# OF DRUMS IN LOADOUT"
This box displays the number of drum pucks that have been placed in the loadout drum.

The "WEIGH MENU" also displays an add to cumulative indicator. The total weight of the loadout drum is subject to an adjustable weight limit (LCU 102 Register N43:215). If the weight of the puck currently held by the lifter, when added to the cumulative weight of the drum pucks held in the loadout drum, will not cause the weight limit to be exceeded, the indicator will display "ADD TO CUMULATIVE POSSIBLE". If the weight of the drum puck held in the lifter will cause the weight limit to be exceeded, the indicator will display "ADD TO CUMULATIVE NOT POSSIBLE".

To load out a drum puck, the operator must pick up the drum puck as described in the "PICK UP DRUM PUCK" section. After the hoist is fully raised, the operator can examine the "WEIGH MENU". If "ADD TO CUMULATIVE NOT POSSIBLE" is displayed, the operator must first remove the full overpack drum and replace with an empty overpack drum before the drum puck can be loaded out. If "ADD TO CUMULATIVE POSSIBLE" is displayed, the operator can press "ADD TO CUMULATIVE" to begin loading out the drum puck. The operator presses "ADD TO CUMULATIVE" and if successful, the message "OPERATOR: MOVE TROLLEY TO LOADOUT POSITION..." should be displayed on the "WEIGH MENU".

The operator can then return to the "HOIST MENU" and press "LOAD OUT". This enables hoist trolley movement to the drum loadout position and causes the message "TROLLEY MOVING TO LOADOUT POSITION...". The operator uses the hoist/trolley pendant left and right buttons to cause the hoist to move to the loadout position. Once the trolley reaches the loadout position, the message "TROLLEY AT LOADOUT POSITION" message is displayed.

The operator can then press "STORE PUCK" to enable the hoist, and if successful, the message "OPERATOR: PLACE DRUM PUCK IN LOADOUT DRUM..." is displayed. The operator then lowers the compacted drum lifter into the loadout drum using the trolley/hoist pendant, adjusts the drum lifter to releases the puck, and then raises the drum lifter. When the drum lifter is fully raised, the message "DRUM PUCK PLACED IN LOADOUT DRUM" should be displayed and the puck pin that was displayed in the "DRUM LIFTER" box should now be displayed in the "LOADOUT" box, and the "DRUM LIFTER" box should now be blank.

After a successful drum puck loadout, the items displayed on the "WEIGH MENU" will also change. The "COMPACT DRUM IN LIFTER" box should be blank and the "COMPACT DRUM WEIGHT (Kg)" weight should be approximately zero. The "CUMULATIVE WEIGHT (Kg)" box should display a cumulative weight that has been incremented by the weight of the last puck loaded out and the "# OF DRUMS IN LOADOUT" should be incremented by one.

The drum puck loadout sequence can be canceled prior to completion. To cancel the sequence, the operator must press the "PICK UP PUCK" button, and if successful, the message "ADD TO CUMULATIVE CANCELED" is displayed on the "TROLLEY MENU".

When a puck PIN is scanned by the compacted drums wand bar code scanner, 12-NT/NE-312, the puck PIN is stored into the LLW Compact Receipt PIN table and the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the puck PIN with LLW_PUCK as the location.

When the compacted drums loadout wand bar code scanner scans a storage location bar code, 12-NT/NE-316, a puck PIN is expected to be scanned next. When the puck PIN is received, the scanned puck PIN is compared to the puck PIN contained in the storage position's PIN table. If the PINs match, "ID MATCH" is displayed at the OIU; if the PINs do not match, "ID MISMATCH" is displayed at the OIU.

When the puck is retrieved from the compact receipt position, indicated by the hoist raised at the compact receipt position and the grab not open, the puck PIN is transferred from the compact receipt PIN table to the hoist PIN table. When a puck is stored into one of the storage positions, indicated by the hoist not raised and the grab being opened, the puck PIN is transferred from the hoist PIN table to the PIN table for the storage position (#1 or #2) and the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the puck PIN with LLW_STORE1 or LLW_STORE2 as the location. When a puck is retrieved from a storage location, indicated by the hoist not raised and the grab being closed, the puck PIN is transferred from the storage position's PIN table to the hoist PIN table. When the puck is raised by the hoist, the puck weight is displayed at the OIU. If the operator chooses to load out the puck and presses the ADD TO CUMULATIVE button on the OIU, provided that the new cumulative weight does not exceed the maximum limit, the file issues a Puck and Overpack Drum Relationship message (Netcom 5.3.12) to the DMS for the puck PIN with LLW_EXIT as the location. At the same time, the file adds the puck weight to the previous cumulative weight and increments the number of pucks in the loadout drum for display on the OIU.

5.3.8 Local Control Unit 102 Program File 45: Low Level Waste Restricted Waste Management Glovebox

The LLW RWM Glovebox is used to sort compliant waste from non-compliant waste that is delivered in packets from the LLW sorting glovebox, provide sampling and treatment capabilities and load-out compliant and non-compliant waste.

5.3.9 Local Control Unit 102 Program File 46: Low Level Waste Supervisory Control

This file is responsible for monitoring the location and data of drums currently on the Process AGV, routing messages between LCU_102 files and other devices on the LAN via NETCOM, handling general messaging between the PCS and other devices on the LAN via NETCOM.

The supervisory control file is the interface between the other files of the PLC and Netcom. When a file issues a Netcom message to a device on the LAN, it copies the message data into the Netcom message Transmit buffer and sets a trigger to notify the supervisory control file that a message is ready to transmit. The supervisory control file then increments an index number (unique to every message transmitted to Netcom) and then sends the message using the PLC Message command.

When Netcom transmits a message to a PLC from another LAN device, Netcom determines which PLC the message is destined for and then copy the message data into the appropriate PLC's Netcom message Receive buffer and set a flag to notify the PLC's supervisory control file that a new message has arrived. The supervisory control file then examines the message data to determine for which file within the PLC the message is destined, and then sets a flag to trigger the destination file to process the message.

Some messages that arrive in the PLC are not bound for any particular file, but rather are shared by various files. In these cases, the supervisory control file copies the message data into a buffer for the specific message and, in some cases, trigger appropriate logic. For example, the receipt of either a Fissile Inventory Level message with the Alarm Existing field set to "T" or a Criticality Alert message from the DMS stops all container movement within the facility. In this case, the supervisory control file sets a bit to stop all container movement controlled by the PLC's files and also triggers the LLW_SUPV file to issue a Disable All AGV Movement message (Netcom 5.5.6) to the AGVCS for the Process AGV.

5.4 LOCAL CONTROL UNIT 103

This files of 104-CNR-12-103 (LCU 103) handle the TRU waste lines of the Process Area of WRAP 1, including the TRU Lift Tables, the TRU Entry, Sorting, Empty Drum Compactor, Empty Drum Loadout, Waste Loadout and RWM Gloveboxes, and also the Empty Drum Staging Conveyors and Fixed Bar Code Processing.

5.4.1 Local Control Unit 103 Program File 32: TRU and TRU RWM Lift Tables

The TRU Lift Tables are used to transfer the drums to/from the Process Area AGV into and out of the TRU Process Gloveboxes. The lift tables in Table 5-3 are controlled by this file.

Table 5-3. TRU and TRU RWM Lift Tables

107-LT-09-201A	TRU RWM Drum Lift Table (Non-Compliant Loadout)
107-LT-09-201B	TRU RWM Drum Lift Table (Compliant Loadout)
107-LT-09-201C	TRU RWM Drum Lift Table (Bagless Transfer Port)
107-LT-09-202B	TRU Drum Lift Table (Entry Port)
107-LT-09-202D	TRU Drum Lift Table (Exit Port)
107-LT-09-202E	TRU Drum Lift Table (Exit Port)
107-LT-09-203B	TRU Drum Lift Table (RWM Transfer Port)
107-LT-09-203C	TRU Drum Lift Table (Empty Drum Loadout)

Because there is only one AGV for the Process Area, and because there are two PLCs that control and interface with the AGV, the data for the drums on the AGV should reside in one PLC, yet be accessible to both PLCs. The "master" AGV drum data table for the Process Area AGV, therefore, resides in the PLC of LCU 102; a mirror of the "master" AGV drum data table resides in the PLC of LCU 103. Whenever a drum is transferred between the AGV and one of the pick-up / drop-off stations controlled by LCU 103, the controlling file in LCU 103 must first update its mirror of the AGV drum data table from LCU 102, transfer the data for the drum between the pick-up / drop-off drum data table and the mirrored AGV drum data table, and then update the "master" AGV drum data table in LCU 102.

When the AGV arrives to drop-off a drum at a lift table, the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer is complete, indicated by the drum passing the AGV-end position switch of the lift table conveyor, the AGV drum data table is read from LCU 102 into the "mirrored" AGV drum data in LCU 103. When the data read is complete, the drum data is transferred from the "mirrored" drum data table for the current deck of the AGV to the drum data table for the current lift table (as discussed above) and the file then issues a Release AGV message (Netcom 5.5.9) to the AGVCS; also, the "Drum Present bit" for the "mirrored" AGV table is cleared, to indicate that the drum is no longer on the AGV and then the "mirrored" table is transferred to LCU 102 to update the master AGV drum data table. Operations to mate the drum to the port then proceed according to WRAP 1 Specification 13462 [1].

When the drum arrives at the AGV-end of the lift table conveyor and the lift table is moved to AGV height (where applicable) as part of the port exit sequence (defined in WRAP 1 Specification 13462 [1]), the file issues an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a pick-up of the drum at the lift table and a drop-off of the drum at its destination (in some cases, the operator must push a button on the OIU to trigger this message). In addition, the process route of the drum is set at this time for drums on the TRU Entry, TRU Empty Drum Loadout, TRU Waste Loadout and the TRU RWM Exit lift tables as follows: LT-09-202B, process route = 103 if the drum is clean; LT-09-203C, process route = 102; LT-09-202D, LT-09-202E, LT-09-201A, LT-09-201B, process route = 101.

When the AGV arrives at a lift table to pick-up a drum, the drum transfer proceeds according to the AGV IRCOM sequence. Once the transfer is complete, indicated by the loss of the AGV input handshake signal, the AGV drum data table is read from LCU 102 to the "mirrored" drum data table in LCU 103. When the data read is complete, the drum data is transferred from the lift table drum data table to the "mirrored" drum data table for the current deck of the AGV (as discussed above) and the "Drum Present bit" for the lift table drum data table is cleared, to indicate that the drum is no longer on the lift table; the "mirrored" drum data table is then transferred to LCU 102 to update the master AGV drum data table. At this time, the file also issues a Release AGV message (Netcom 5.5.9) to the AGVCS and an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a drop-off of a drum at the lift table.

Note that, because the lift tables (for raise and lower operations) and the sorting table are controlled via the Sercom serial link, all TRU lift tables and the TRU Sorting Table MUST be connected and powered on for any lift table raise or lower or sorting table operations to be executed. If a lift table or the sorting table has been powered down, the servo motor needs to be re-homed via the OIU Maintenance Menu option.

5.4.2 Local Control Unit 103 Program File 33: Empty Drum Staging Conveyors

The two empty drum staging conveyors are used to store empty 85-gallon and 55-gallon (respectively) drums while awaiting access to the process gloveboxes.

Because there is only one AGV for the Process Area, and because there are two PLCs that control and interface with the AGV, the data for the drums on the AGV should reside in one PLC, yet be accessible to both PLCs. The "master" AGV drum data table for the Process Area AGV, therefore, resides in the PLC of LCU 102; a mirror of the "master" AGV drum data table resides in the PLC of LCU 103. Whenever a drum is transferred between the AGV and one of the pick-up / drop-off stations controlled by LCU 103, the controlling file in LCU 103 must first update its mirror of the AGV drum data table from LCU 102, transfer the data for the drum between the pick-up / drop-off drum data table and the mirrored AGV drum data table, and then update the "master" AGV drum data table in LCU 102.

When the AGV arrives to drop-off a drum at a conveyor, the drum transfer proceeds according to the AGV IRCOM sequence. When the drum transfer is complete, indicated by the drum triggering the Index position switch of the conveyor, the AGV drum data table is read from LCU 102 into the "mirrored" drum data table in LCU 103. When the data read is complete, the drum data is transferred from the drum data table for the current deck of the AGV to the drum data table for the current lift table (as discussed above) and the data for the drums already on the conveyor are shifted up by (1) position; also, the "Drum Present bit" for the "mirrored" AGV drum data table is cleared, to indicate that the drum is no longer on the AGV and then the "mirrored" table is transferred to LCU 102 to update the master AGV drum data table. At the same time, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PIN with STGCVR_85G or STGCVR_55G as the location and an AGV Transport

Command message (Netcom 5.5.3) to the AGVCS to command a pick-up of the drum at the conveyor and request a drop-off at its destination (TRU_COMPCT for CV-09-203 or TRU_GENEXT for CV-09-204).

When the AGV arrives at a conveyor to pick-up a drum, the drum transfer proceeds according to the AGV IRCOM sequence. Once the transfer is complete, indicated by the loss of the AGV input handshake signal, the AGV drum data table is read from LCU 102 into the "mirrored" drum data table in LCU 103. When the data read is complete, the drum data is transferred from the conveyor drum data table to the "mirrored" drum data table for the current deck of the AGV (as discussed above), the "Drum Present bit" in the drum data table for the conveyor's last position is cleared, to indicate that the drum is no longer on the conveyor, and the data for the remaining drums on the conveyor are shifted down by (1) position; also, the "mirrored" data table is transferred to LCU 102 to update the master AGV drum data table. At the same time, if there are less than (5) drums on the conveyor, the file also issues an AGV Transport Command message (Netcom 5.5.3) to the AGVCS to command a drop-off of a drum at the lift table.

5.4.3 Local Control Unit 103 Program File 50: Transuranic Entry Glovebox

The TRU Entry Glovebox is the first glovebox for the TRU process line. An 85-gallon overpack drum is mated to the TRU Entry Port and then a 55-gallon waste drum is removed from the overpack. Through a combination of operator and automatic operations the drum is brought into the entry glovebox, tested for contamination, and moved into position on the drum transfer car for transfer into the sorting glovebox. The overpack is tested for contamination, re-lidded and sent to the RWM carousel or back to the airlock conveyors for transfer to Shipping/Receiving.

After the drum is delivered to the TRU Entry Glovebox Lift Table (LT-09-202B), the drum data is transferred into the lift table data table and the TRU_LIFT file sends a Container Location Update message to the DMS. When the DMS responds with a Container Location Update message (Netcom 5.4.1), if the location field in the message is TRU_ENTRY, the file copies the drum PIN contained in the message (which is the drum PIN of the inner waste drum pulled out of the overpack drum) to the TRU Entry Glovebox drum data table and set the Drum Present flag.

When the drum is transferred from the hoist to the upper drum grab of the drum transfer device, the drum data is transferred from the TRU Entry Glovebox drum data table to the drum transfer device's upper grab drum data table. After the handover sequence is initiated, via a pushbutton on the OIU, and the upper drum grab is opened, the drum data is transferred from the upper grab data table to the lower grab drum data table.

When the lower to transfer car sequence is complete, indicated by the lower grab open, the drum data is transferred from the drum transfer device's lower grab drum data table to the TRU Sorting Glovebox Drum Transfer Car drum data table.

5.4.4 Local Control Unit 103 Program File 51: Transuranic Sorting Glovebox

The TRU Sorting Glovebox is used to separate compliant from non-compliant waste. A 55-gallon waste drum enters the sorting glovebox through the transfer port at the entry glovebox. Through a combination of operator and automatic operations the drum is brought into the sorting glovebox, opened, and its contents dumped onto the sorting table. The operator sorts the non-compliant items and places them into an RWM Transfer drum. The remaining items are dumped back into the original drum, the drum is re-lidded and then moved to the compactor.

When the packet assay door has been successfully closed, the file enables the OIU "PAM" menu selection. Selection of the "Enable PAM" at the OIU causes the file to issue the Enable (Start) Packet Assay Monitor System message (Netcom 5.9.2) to the PAM system.

When the drum is picked-up from the transfer car by the drum tipper and the "Raise with Grab Closed" sequence is complete, the drum data is transferred from the transfer car drum data table to the drum tipper drum data table and the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum in the drum tipper. When the drum is lowered back onto the drum transfer car from the drum tipper and the "Open Grab and Park" sequence has been completed, the drum data is transferred from the drum tipper data table to the transfer car drum data table.

5.4.5 Local Control Unit 103 Program File 52: Transuranic Empty Drum Compact Glovebox

The Empty Drum Compact Glovebox is used to compact empty process drums from the sorting glovebox. The 55-gallon waste drums arrive via the drum transfer car from the sorting glovebox, are compacted, and then are transferred to the TRU Empty Drum Loadout Glovebox.

The Empty Drum Compactor and the LLW Supercompactor share the same controller and Operator Interface Unit, which is directly interfaced to through the LLW_COMPCT file in LCU 102. All control and data for the Empty Drum Compactor, therefore, must pass through the LLW_COMPCT file. Compactor status data is read into the LLW_COMPCT file and then is passed via the WRAP LAN to this file. Similarly, all control from this file is first passed to the LLW_COMPCT file via the WRAP LAN and then onto the compactor controller.

Communications between the PLC of LCU 102 and the compactor controller is accomplished via the Data Highway Plus (DH+ = an Allen-Bradley RS-485 multi-drop network implementation) link. DH+ allows a PLC to read and write data directly to the memory of another PLC. The memory locations being accessed in the compactor PLC are listed in the SDD of the compactor.

5.4.6 Local Control Unit 103 Program File 53: Transuranic Empty Drum Loadout Glovebox

The Empty Drum Loadout Glovebox is used to accumulate and loadout compacted empty drums from the empty drum compactor.

The TRU Empty Drum Loadout Glovebox (107-GB-07-306) is used to transfer empty compacted drums to a 322 liter (85 gallon) overpack drum. The TRU Transfer Car (107-TC-07-301) carries a drum puck to the glovebox. After a drum puck is brought to the Glovebox, the following drum puck operations are possible:

1. Pick up drum puck using the Drum Lifter (DH-07-303)
2. Transfer drum puck from lifter to Transfer Car (DH-07-303)
2. Load drum puck into loadout drum

NOTE: The drum lifter (DH-07-303) weight scale should be zeroed out prior to each shift, or more frequently as required.

To pick up a drum puck, the operator must first move the hoist trolley so that it is centered over the transfer car. The operator must then lower the hoist chain, open the drum lifter, securely grip the drum puck with the lifter, and then raise the lifter using the hoist/trolley pendant. The operator can move the hoist only when the hoist chain is fully raised.

The operator should press "PICK UP PUCK" if a puck transfer from storage position to drum lifter is desired. The operator should press "STORE PUCK" if a puck transfer from drum lifter to storage position is desired.

To transfer a puck to the drum lifter, a drum should be present on the transfer car and no drum should be held in the lifter. The operator must also verify that the "WEIGH MENU" reflects this status. On the "WEIGH MENU", the drum pin should be displayed in the "COMPACT DRUM ON CAR" box but not in the "COMPACT DRUM IN LIFTER:" box. The operator presses "PICK UP PUCK" and, if successful, the message "OPERATOR: PICK UP DRUM PUCK..." will be displayed on the "WEIGH MENU". The operator then lowers and opens the compacted drum lifter using the hoist/trolley pendant, adjusts the drum lifter to firmly grip the puck, and then raises the drum lifter with puck until the hoist chain is fully raised. Because the weight scale measures the weight of the puck held in the lifter, the message "DRUM PUCK HELD BY LIFTER" should be displayed on the "WEIGH MENU" and the puck pin that was displayed in the "COMPACT DRUM ON CAR:" box should now be displayed in the "COMPACT DRUM IN LIFTER:" box. The "COMPACT DRUM ON CAR:" box should now be blank.

In certain cases, the operator may need to return the drum puck from the drum lifter to the transfer car. To return the drum puck to the transfer car, the operator must first move the hoist trolley so that it is centered over the transfer car. The operator can move the hoist only when the

hoist chain is fully raised. The operator must then lower the hoist chain until the drum puck rests on the transfer car and slack is noted in the chain. The operator then opens the drum lifter, releases the drum puck from the lifter, and then raises the lifter using the hoist/trolley pendant.

The operator should press "PICK UP PUCK" if a puck transfer from transfer car to drum lifter is desired. The operator should press "STORE PUCK" if a puck transfer from the drum lifter to the transfer car is desired.

To return a puck held by the drum lifter to the transfer car, no drum should be present on the transfer car. The operator must verify that the "WEIGH MENU" reflects this status. On the "WEIGH MENU", the puck pin should be displayed in the "COMPACT DRUM IN DRUM LIFTER:" box and no puck pin should be displayed in the "COMPACT DRUM ON CAR:" box. The operator then lowers the compacted drum lifter using the hoist/trolley pendant, opens adjusts the drum lifter to releases the puck, and then raises the drum lifter. When the drum lifter is fully raised, the puck pin that was displayed in the "COMPACT DRUM IN LIFTER" box should now be displayed in the "COMPACT DRUM ON CAR:" box. The "COMPACT DRUM IN LIFTER" box should now be blank.

To load out a drum puck, the operator must pick up the drum puck, weigh the drum puck, and press the "ADD TO CUMULATIVE" button on the "WEIGH MENU". The operator can then move the hoist trolley to the loadout position, place the puck in the load out drum, and fully raise the lifter without the drum puck.

The "WEIGH MENU" displays the following items related to drum puck loadout:

1. "COMPACT DRUM ON CAR:"
   This box displays the pin for the drum puck that the PCS is currently tracking as being on the transfer car. If there is no drum puck on the transfer car, this box should be blank.

2. "COMPACT DRUM IN LIFTER:"
   This box displays the pin for the drum puck that the PCS is currently tracking as being held by the drum lifter. If there is no drum puck held in the drum lifter, this box should be blank.

3. "LAST DRUM LOADED OUT:"
   This box displays the pin of the last drum puck that was placed into the loadout drum. If a new, empty loadout drum is present, this box should be blank.

4. "COMPACT DRUM WEIGHT (Kg)"
   This box displays the weight, in kilograms, of the drum puck currently held by the lifter. If the drum lifter is suspended without a puck, the weight should be 0.0 +/- 2 kilograms. If the weight of the empty, freely suspended drum lifter exceeds this range, the drum lifter weight scale should be zeroed.

5. "CUMULATIVE DRUM WEIGHT (Kg)"
This box displays the cumulative weight, in kilograms, of all drum pucks that have been placed in the loadout drum.

6. "# OF DRUMS IN LOADOUT"
This box displays the number of drum pucks that have been placed in the loadout drum.

The "WEIGH MENU" also displays an add to cumulative indicator. The total weight of the loadout drum is subject to an adjustable weight limit (LCU 103 Register N53:108). If the weight of the puck currently held by the lifter, when added to the cumulative weight of the drum pucks held in the loadout drum, will not cause the weight limit to be exceeded, the indicator will display "ADD TO CUMULATIVE POSSIBLE". If the weight of the drum puck held in the lifter will cause the weight limit to be exceeded, the indicator will display "ADD TO CUMULATIVE NOT POSSIBLE". As a practical matter, this weight limit should never be exceeded when loading out empty compacted drums.

To load out a drum puck, the operator must pick up the drum as described above. After the hoist is fully raised, the operator can examine the "WEIGH MENU". If "ADD TO CUMULATIVE NOT POSSIBLE" is displayed, the operator must first remove the full overpack drum and replace with an empty overpack drum before the drum puck can be loaded out. If "ADD TO CUMULATIVE POSSIBLE" is displayed, the operator can press "ADD TO CUMULATIVE" to begin loading out the drum puck. The operator presses "ADD TO CUMULATIVE" and if successful, the message "OPERATOR: PLACE DRUM PUCK IN LOADOUT DRUM..." should be displayed on the "WEIGH MENU".

The operator then moves the hoist trolley to the loadout position, and lowers the compacted drum lifter into the loadout drum using the trolley/hoist pendant. The operator opens and adjusts the drum lifter to releases the puck, and then raises the drum lifter. When the drum lifter releases the drum puck, the message "DRUM PUCK PLACED IN LOADOUT DRUM" should be displayed and the puck pin that was displayed in the "DRUM LIFTER" box should now be displayed in the "LAST DRUM LOADED OUT:" box. The "DRUM LIFTER" box should now be blank.

The drum puck loadout sequence can be canceled prior to completion. To cancel the sequence, the operator must press the "PICK UP PUCK" button, and if successful, the message "ADD TO CUMULATIVE CANCELED" is displayed on the "WEIGH MENU".

When the drum is picked-up from the transfer car by the drum hoist at the Empty Drum Loadout Glovebox, the drum data is transferred from the transfer car drum data table to the empty drum loadout drum data table and the weight of the compacted drum is read from the weight transmitter. If the operator selects "Add To Cumulative", the weight is added to the cumulative weight of the overpack drum (on lift table LT-09-203C) and the file issues a Puck

and Overpack Drum Relationship message (Netcom 5.3.12) for the compacted drum PIN and the drum PIN in the Empty Drum Loadout Lift Table (LT-09-203C) drum data table and a Container Location with Weight message (Netcom 5.3.2) to the DMS for the compacted drum PIN and the weight. When the operator closes the overpack drum port, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PIN in the Empty Drum Loadout Lift Table (LT-09-203C) drum data table.

5.4.7 Local Control Unit 103 Program File 54: Transuranic Waste Loadout Glovebox

The Waste Loadout Glovebox is used to accumulate and loadout compliant waste from the sorting glovebox. This file is responsible for control of both TRU Waste Loadout ports (DO-309 & DO-310).

5.4.8 Local Control Unit 103 Program File 56: Transuranic Restricted Waste Management Glovebox

The TRU RWM Glovebox is used to sort compliant waste from non-compliant waste that are delivered in packets from the TRU sorting glovebox, provide sampling and treatment capabilities and load-out compliant and non-compliant waste.

5.4.9 Local Control Unit 103 Program File 57: Transuranic Supervisory Control

This file is responsible for routing of messages between LCU_103 files and other devices on the LAN via NETCOM, and handling of general messaging between the PCS and other devices on the LAN via NETCOM

The supervisory control file is the interface between the other files of the PLC and Netcom. When a file issues a Netcom message to a device on the LAN, it copies the message data into the Netcom message Transmit buffer and sets a trigger to notify the supervisory control file that a message is ready to transmit. The supervisory control file then increments an index number (unique to every message transmitted to Netcom) and then sends the message using the PLC Message command.

When Netcom transmits a message to a PLC from another LAN device, Netcom determines which PLC the message is destined for and then copy the message data into the appropriate PLC's Netcom message Receive buffer and set a flag to notify the PLC's supervisory control file that a new message has arrived. The supervisory control file then examines the message data to determine for which file within the PLC the message is destined, and then sets a flag to trigger the destination file to process the message.

Some messages that arrive in the PLC are not bound for any particular file, but rather are shared by various files. In these cases, the supervisory control file copies the message data into a buffer for the specific message and, in some cases, trigger appropriate logic. For example, the receipt

of either a Fissile Inventory Level message with the Alarm Existing field set to "T" or a Criticality Alert message from the DMS stops all container movement within the facility. In this case, the supervisory control file sets a bit to stop all container movement controlled by the PLC's files.

5.4.10 Local Control Unit 103 Program File 58: Fixed Bar Code

Fixed bar code processing refers to the interface between the fixed bar code terminals and the PCS. All of the fixed terminals are connected via a multi-dropped RS-485 (or RS-422, in the case of the wand bar code scanners at the LLW Exit Glovebox) connection to the RB interface module attached to the PLC in LCU 103. The messages from a fixed terminal are different than from a portable terminal but are handled the same on a system level.

This file handles the detailed messaging between the fixed terminals and the PCS, which includes translating the messages from/to the terminals to/from a general message format that Netcom uses to process and route the messages. Additional barcode information is provided in section 7 of this document

When a fixed bar code scanner scans a bar code, the RB module receives the bar code and sets its BRR bit to indicate to the PLC that a bar code is waiting to be transferred into the PLC. The file then copies the bar code into the Fixed Bar Code Data Receive Buffer, examines it for a valid bar code (i.e. not a NO-READ or an RB module command response), and then formats the message as a Netcom message, with General and Specific numbers of 1 and sends the message, via the Supervisory Control File, to Netcom.

When a Netcom message is received with General and Specific numbers of 1, which indicates that the message contains bar code display data, the file formats the message and places header information specific to the terminal number of the scanner for which the message is bound and then transfers the message to the RB module, which then forwards the display data to the appropriate bar code terminal.

5.5 LOCAL CONTROL UNIT 104

The files of the PLC in 203-CNR-12-104 (LCU 104) interface to the AS/RS system, the Heating, Ventilation, and Air Conditioning (HVAC) Controller and the health physics monitors as well as monitoring various facility-wide systems. It includes the AS_RS File, the HVAC File, the Health Physics Monitors File, the Facilities Miscellaneous File and the HVAC Supervisory Control File.

5.5.1 Local Control Unit 104 Program File 12: Automated Stacker Retriever System

This file is used for control of the AS/RS. Drums on pallets are checked into the AS/RS for storage until processing. When a drum or list of drums are to be processed they are checked out of the AS/RS. The AS/RS has its own computer controller that the PCS interfaces to over the network.

This file is used/activated when the bar code received is a location bar code for the AS/RS. All subsequent bar codes from the scanner are processed and checked by this file.

Table 5-35. Automated Stacker Retriever System Marquee Messaging

Marquee Message	Address N90:	Trigger	Description/Notes
AS/RS READY	899		Shown when no operation in progress and the AS/RS is ready
AS/RS NOT READY	784		Shown whenever the AS/RS is not ready due to an operation in progress or an error
SCAN DRUM PINS OR COMMAND	615	Scan PSTND or XFRCAR location	Initial message
n PSTND DRUM ID'S ENTERED	630	After store drums command received	Where n is the number of PINs scanned
n TCAR DRUM ID'S ENTERED	681	After store drums command received	Where n is the number of PINs scanned
>4 DRUM PINS ENTERED	578	When more than 4 drum PINs have been scanned at the PSTND	
PICK LIST INCLUDE: ZZZ	657	When a pallet has been retrieved	Where x is the drum PIN of a drum that matches the pick list.
CAN'T FIND/RTV DRUMS	835	AS/RS Status = 2 and Error Code = 4016	
NO LOC'S	426	AS/RS Status = (0x) 0200	No storage locations available
DRUM PIN MISMATCH	774	None of the retrieved drums are on the pick list. The stored PSTND drums are not in the Infeed, Received or Float tables	

After the file receives the AS/RS Stored Pallet From Pallet Stand Confirm message (Netcom 5.8.2) from the AS/RS, the message data is copied into the message buffer, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PINs contained in the message with AS_RS as the location and the file issues a Request AS/RS Drum Database message (Netcom 5.7.16) to the AS/RS to update the database (for RTAP display).

After the file receives the AS/RS Retrieved Pallet to Pallet Stand message (Netcom 5.8.3) from the AS/RS with n number of drums retrieved, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PINs contained in the message with PSTND as the location. The n drum PINs at the pallet stand are compared to the appropriate pick list

(depending upon which command was issued to retrieve the drums to the pallet stand). Because the next PIN on the pick list was used to tell the AS/RS which pallet to retrieve, the pallet at the pallet stand should now have at least one drum that is on the pick list. All n PINs reported to be at the pallet stand are checked against the entire pick list for any matches. The drums that are on the pick list are either removed from the PSTND table (in the case of shipping) or moved to the Infeed Staging Area table (in the case of processing). The drums that are not in the pick list are moved to the Float table. The drum PINs that are found on the pick list (for all pick lists except the Processing Pick List) are replaced with "PROCESSED" and the appropriate pick list pointer is incremented. If the pallet was retrieved as a result of the RTV DRMPS bar code command, the drum data in the pick list is replaced with "IN PROCESS". The file issues a Request AS/RS Drum Database message (Netcom 5.7.16) to the AS/RS to update the database (for RTAP display).

After the file receives the AS/RS Stored Pallet From Transfer Car Confirm message (Netcom 5.8.4) from the AS/RS, the message data is copied into the message buffer, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PINs contained in the message with AS_RS as the location and the file issues a Request AS/RS Drum Database message (Netcom 5.7.16) to the AS/RS to update the database (for RTAP display).

After the file receives the AS/RS Retrieved Pallet From Transfer Car Confirm message (Netcom 5.8.5) from the AS/RS, the message data is copied into the message buffer, the file issues a Container Location Update message (Netcom 5.3.1) to the DMS for the drum PINs contained in the message with XFRCAR as the location and the file issues a Request AS/RS Drum Database message (Netcom 5.7.16) to the AS/RS to update the database (for RTAP display).

After the file receives the AS/RS Drum Database message (Netcom 5.8.6) from the AS/RS, the file determines which portion of the database is contained in the message (because of the size of the database, it must be transmitted in up to 3 separate messages), then the data is copied into the message buffer.

After a Fissile Inventory Level message (Netcom 5.4.2) is received with a "T" in the Alarm Existing field or a Criticality Alert message (Netcom 5.4.14) is received, the file issues a Disable All AS/RS Drum Movement message (Netcom 5.7.17) to the AS/RS. When both alarm conditions are cleared, the file issues an Enable All AR/RS Drum Movement message (Netcom 5.7.18) to the AS/RS.

5.5.2 Local Control Unit 104 Program File 63: Heating, Ventilation, and Air Conditioning

The HVAC controller has direct control over the heating, ventilation and air-conditioning for the entire WRAP 1 facility. The PCS interfaces to the controller via both serial communications and discrete I/O. This file deals with the overall control and discrete I/O.

5.5.3 Local Control Unit 104 Program File 64: Health Physics Monitors

The Health Physics Monitors are located throughout the facility to monitor radiation levels. Monitoring includes alpha, beta and gamma radiation levels as well as criticality sensors. The alarm setpoints for high radiation levels are set at the devices, not in the PCS.

5.5.4 Local Control Unit 104 Program File 65: Facilities Miscellaneous

This file includes the fire protection system, the electrical power system, and the compressed air system.

5.5.5 Local Control Unit 104 Program File 66: Heating, Ventilation, Air Conditioning *Supervisory Control*

This file is responsible for routing messages between LCU_103 files and other devices on the LAN via NETCOM, and handling of general messaging between the PCS and other devices on the LAN via NETCOM

The supervisory control file is the interface between the other files of the PLC and Netcom. When a file issues a Netcom message to a device on the LAN, it copies the message data into the Netcom message Transmit buffer and sets a trigger to notify the supervisory control file that a message is ready to transmit. The supervisory control file then increments an index number (unique to every message transmitted to Netcom) and then sends the message using the PLC Message command.

When Netcom transmits a message to a PLC from another LAN device, Netcom determines which PLC the message is destined for and then copy the message data into the appropriate PLC's Netcom message Receive buffer and set a flag to notify the PLC's supervisory control file that a new message has arrived. The supervisory control file then examines the message data to determine for which file within the PLC the message is destined, and then sets a flag to trigger the destination file to process the message.

Table 5-4. PLC Program File Data Validation

	Bar Code	Drum PIN	Drum Weight	Route	Packet PIN	Puck Pin	Bar Code Message	UNUSED CATEGORY
LCU 101								
Drum Infeed Conveyor A.	•	•						
Drum Scale Conveyor A	•	•	•					
Drum Scale Conveyor B	•	•	•					
Drum Infeed Conveyor B				•				
Empty Drum Infeed Conveyor	•	•		•				
Boxed Waste Assay	•							
Box Nondestructive Examination.	•							
LCU 102								
LLW and LLW RWM Lift Tables	•	•						
Low Level Waste Sorting Glovebox	•							
Low Level Waste Exit Glovebox	•					•		
Low Level Waste Restricted Waste Management Glovebox	•				•			
LCU 103								
TRU and TRU RWM Lift Tables	•	•						
Transuranic Sorting Glovebox	•							
Transuranic Restricted Waste Management Glovebox	•				•			
Fixed Bar Code							•	
LCU 104								
Automated Stacker Retriever System	•							

Table Key

Item	Data Validation Description
Bar Code	Bar code is checked against bar code table for valid locations, PINs and commands
Drum PIN	Scanned drum PIN checked against drum data table
Drum Weight	Weight is checked against limits, as applicable.
Route	Route checked against valid routes
Packet Pin	Scanned packet PIN checked against valid packet values.
Puck Pin	Scanned puck PIN checked against valid puck values
Bar Code Message	Fixed reader checked for "NO READ" status

Table of Contents

List of Figures

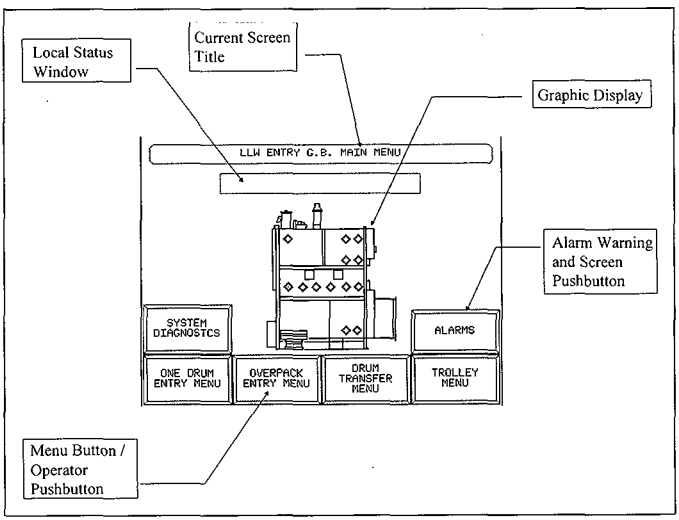
6.0 OPERATOR INTERFACE UNITS

6.1 INTRODUCTION

Operator Interface Units (OIUs) are color flat-panel displays used to control equipment operation. The OIUs are "touch sensitive." Equipment is controlled by pressing buttons displayed on the OIU screen. One vendor that has supplied OIU displays is Total Control Products [1].

This section describes the layout for a typical OIU screen. Each screen is customized to support individual equipment functions. Figure 6-1 was generated from an actual OIU screen display. The figure shows the general screen layout for the WRAP OIUs.

Figure 6-1. Example OIU Screen



Key:

Screen Title: Name of the screen that is currently being displayed.

Graphic Display: A graphical representation of the device or devices that are being controlled.

Status Window: Window displays the status of the device being controlled by the Programmable Logic Controller. (i.e., - System Initialized, Sequence Failed, Open Port Sequence Complete, etc.)

Pushbutton: Pushbutton allows the operator to move to the selected screen menu or operate a local device or start an automatic sequence. All buttons except the Alarms button and the System Diagnostics button are disabled until the system is initialized.

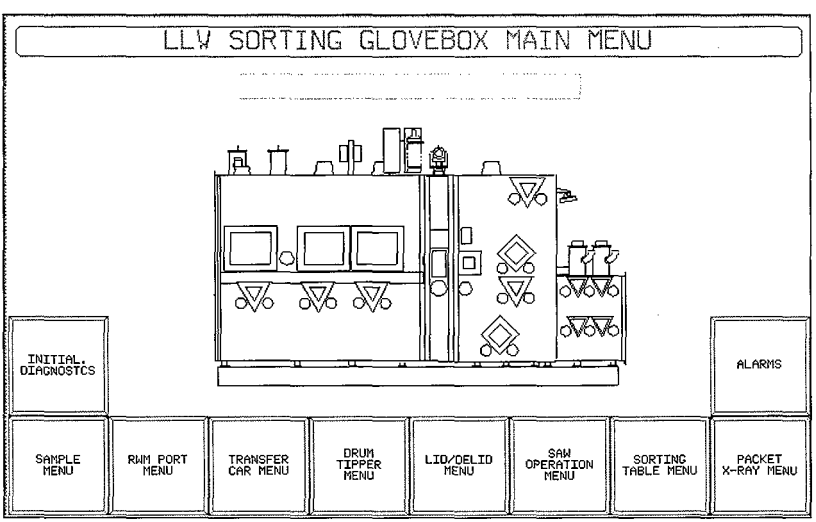
Alarm Pushbutton: When the locally controlled unit reaches an alarm condition, "Sequence Failed" is displayed in the Local Status Window and the alarm pushbutton will flash to let the operator know that there is an alarm that must be acknowledged. Pressing the "flashing" button will display the alarm screen where the operator can acknowledge the alarm.

6.2 OPERATION INTERFACE UNIT SCREEN LAYOUT

The touch screen OIUs display menus, pushbuttons, messages, and alarms. The OIU display is a flat membrane panel. Several pushbuttons are typically displayed on each panel. Operators can press these buttons to access different menus, review the status of glovebox equipment, initiate equipment processing sequences, enter a password and access maintenance mode, or display and acknowledge local glovebox alarms.

The OIUs use a menu system. Each OIU has several menu screens. Only one screen can be displayed at any given time. When the OIU is turned on, an initial, "MAIN MENU" screen is displayed. Each button that displays the word "menu" as part of its title can be pressed to view other OIU menu screens. A "MAIN MENU" or a "MAINT. MAIN MENU" button is provided on each submenu screen to allow an operator to return to the main menu.

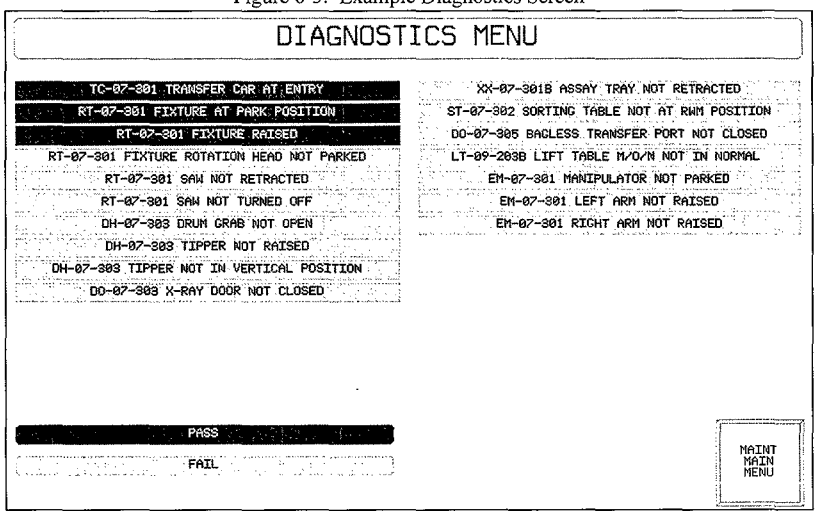
Figure 6-2. Example OIU Screen



6.3 DIAGNOSTICS MENU

An example Diagnostics Menu is provided in Figure 6-3. On the "DIAGNOSTICS MENU" screen, the operator can review the current status of glovebox equipment items. The text for each equipment item indicates whether or not that item is in an initialized state. Items that are in an initialized state are displayed with a green background. Those items not in an initialized state are displayed with a red background.

Figure 6-3. Example Diagnostics Screen

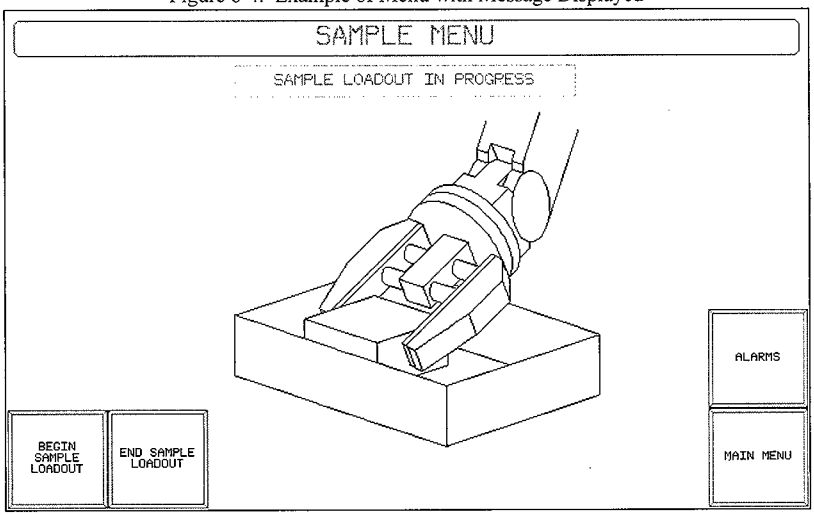


NOTE: Items that are not initialized are displayed with negative text (e.g., "not parked," etc.). After equipment is actuated to provide the initialized condition, the indicator will change from red to green. Generally, initialized items are displayed with "positive text," e.g., retracted, parked, etc.).

6.4 MENU NAVIGATION

After initialization, equipment sequences may be performed. As displayed in Figure 6-4, the operator pressed the "BEGIN SAMPLE LOADOUT" button to initiate the sample loadout sequence. When equipment sequences are initiated, a message is typically displayed on the OIU menu. In this case, initiating the sample loadout sequence caused the "SAMPLE LOADOUT IN PROGRESS" message to be displayed.

Figure 6-4. Example of Menu with Message Displayed

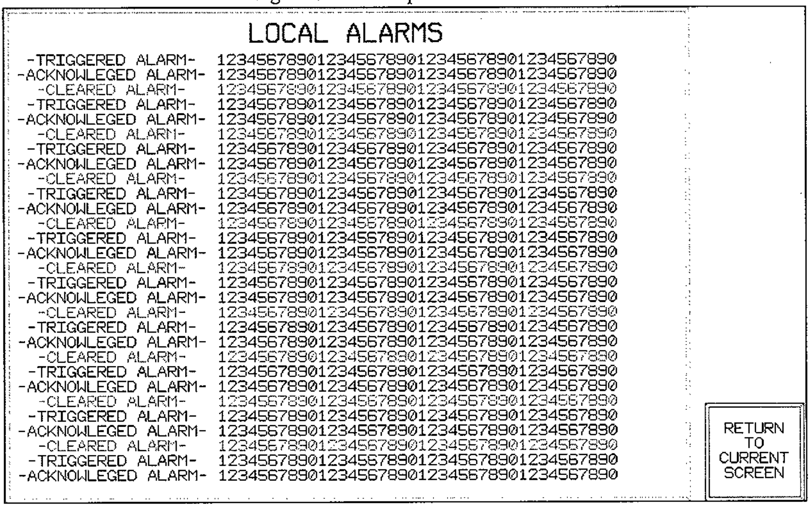


6.5 ALARMS

If a fault occurs during a processing sequence, the alarms button on each menu screen begin flashing. The operator can press the "ALARMS" button to view the currently active alarms. An example alarms screen is shown in Figure 6-5.

Operators acknowledge alarms by pressing the center of the alarms screen. When the screen is pressed, a system screen (example screen not available) is displayed with buttons that allow alarms to be acknowledged and deleted.

Figure 6-5. Example Alarm Screen

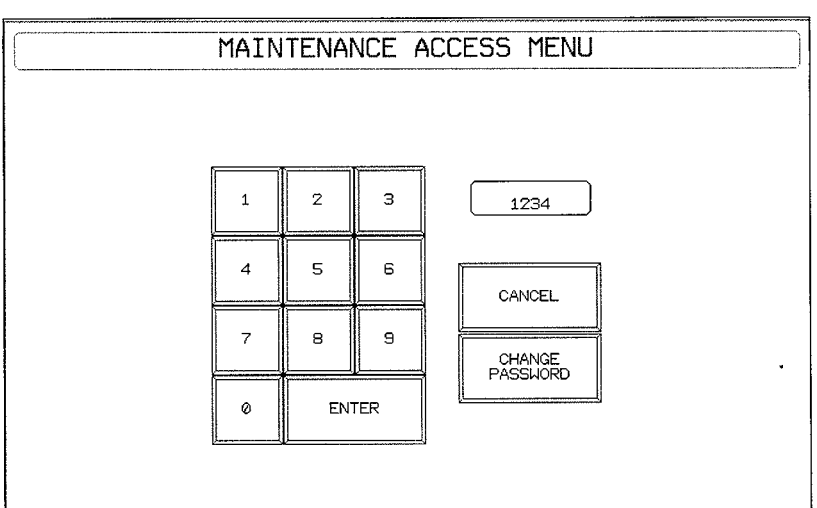


6.6 MAINTENANCE MENU ACCESS

WARNING: Maintenance Menus allow equipment to function with some or all interlocks removed, which could cause equipment damage or personal injury. Use maintenance menus only with proper authorization and ONLY WITH EXTREME CAUTION.

Maintenance menus are provided to reset equipment faults. Switching from automatic mode to maintenance mode on the Low Level Waste (LLW) and Transuranic Waste (TRU) glovebox lines is accomplished via a key switch. Switching from automatic mode to maintenance mode on the Low Level Waste Restricted Waste Management (LLW RWM) and Transuranic Waste Restricted Waste Management (TRU RWM) gloveboxes is accomplished by a "MAINT. MENU" button present on the main pressed OIU menu. A maintenance access menu is displayed. To access the maintenance menus, a numeric "password" must be entered using this menu. An example "MAINTENANCE ACCESS" menu is provided in Figure 6-6.

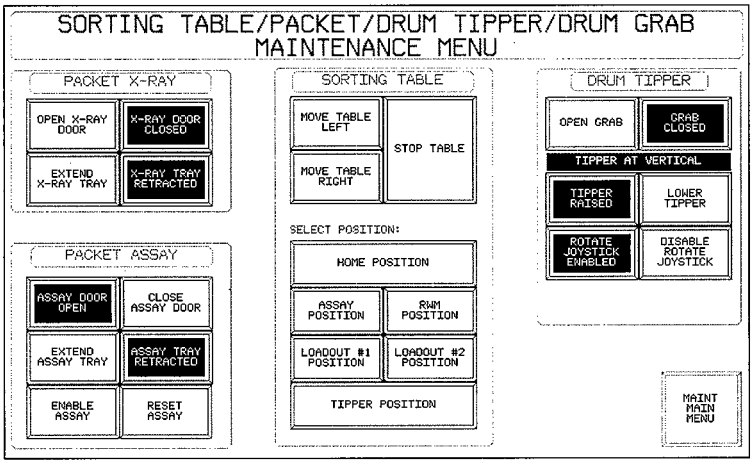
Figure 6-6. Example Maintenance Access Menu



6.7 MAINTENANCE MENUS

An example Maintenance Menu is provided in Figure 6-7. Maintenance menus typically include buttons and indicators. In many instances, buttons and indicators are combined. For example, one button may be used to open a door and another button to close the door. These same buttons may also indicate whether the door is open or closed. In this example, if a position switch indicated that the door is closed, the button labeled "CLOSE X-RAY DOOR" changes state to indicate "X-RAY DOOR CLOSED". If a position switch indicates that the door is open, the button labeled "OPEN X-RAY DOOR" changes state to indicate "X-RAY DOOR OPEN". Buttons and indicators are combined to provide operational feedback despite limited display space on each OIU.

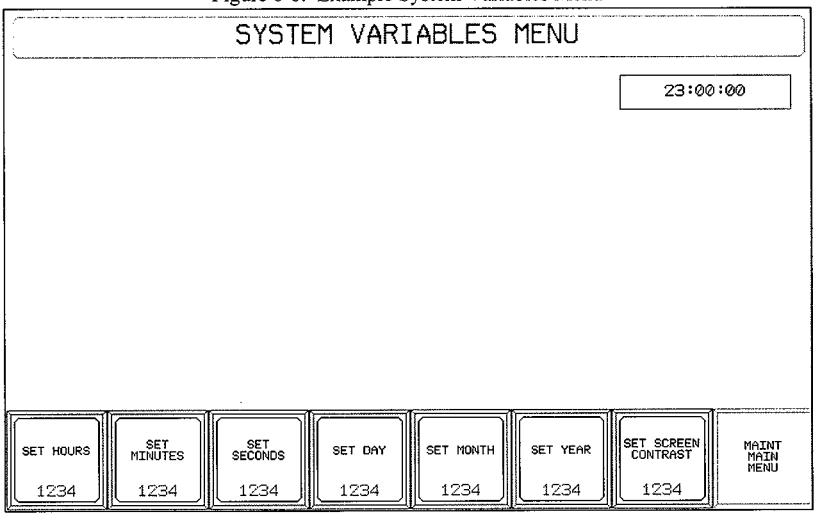
Figure 6-7. Example Maintenance Menu



6.8 SYSTEM VARIABLES

Maintenance menu access includes the ability to set OIU system variables via the "SYSTEM VARIABLES MENU". OIU system variables include date, time, and system contrast. An example "SYSTEM VARIABLES MENU" is provided in Figure 6-8.

Figure 6-8. Example System Variables Menu



6.9 OPERATOR INTERFACE UNITS PROGRAMMING CONVENTIONS

Several conventions have been generally followed when programming OIUs. These conventions include:

- OIU button text and messages should be consistent between identical equipment items.
- Extra words should be removed. All text should be both simple and clear.
- All OIU menus should be titled. The word "MENU" should be included in each menu title.
- Menu titles and the text for the button used to access each menu should be consistent. For example, the "LLW RWM PORT" button should not be used to access the "WM PORT MENU". Instead both button text and menu title should be consistent.
- All OIU buttons should use a consistent format. A "VERB-NOUN" format is recommended. For example, consistently use "OPEN PORT" to open a port, rather than "PORT OPEN".
- All OIU indicators should use a consistent format. A "NOUN-ADJECTIVE" format is recommended. For example, consistently use "PORT OPEN" with an indicator that shows that the port is open.
- All OIU buttons should be sufficiently detailed to exactly identify the function performed by the button.
- To the greatest extent possible, OIU buttons should be arranged in sequential operating order, while preventing unwanted sequences.

6.10 REFERENCES

1 Total Control Products, 2001 N. Janice Avenue, Melrose Park, IL 60160 (708) 345-5500

Table of Contents

List of Tables

7.0 BAR CODE SYSTEM

7.1 OVERVIEW

Bar code labels are used in WRAP to track drums, packets, samples, and other waste-containers. The WRAP bar code system includes both fixed and portable bar code readers, the hardware and software necessary to support the readers, and a bar code label printer.

7.1.1 Related Items

- The Hanford WRAP Module 1 Bar Code System Operation and Maintenance Manual includes vendor catalogs, data sheets, and configuration settings for bar code items.
- Drawing H-2-131805 displays the primary components of the WRAP bar code system.
- Section 8 of this document contains additional bar code information, including Data Qualifier and Data Identifier enumerations.
- The hardware and software configurations for each bar code system item have been recorded to facilitate operation and maintenance.

All WRAP bar code labels use standard code 39 symbology. "Data Qualifiers" and "Data Identifiers" are used to prevent errors during bar code use. "Data Identifiers" are prefix characters and "Data Qualifiers" are suffix characters printed on the bar code label. The PCS decodes these characters to verify that the bar code label scanned is the correct type of label for the operation being performed.

7.2 BAR CODE SCANNERS

7.2.1 Radio Frequency Bar Code Scanners

Portable radio frequency bar code terminals are used at WRAP. Each terminal has a unique terminal ID number. Only specific terminal ID's are valid for each area of the plant. The shipping/receiving areas (including the AS/RS) and the Box NDE and BWAS locations accept bar code scans only from terminals 1 and 2. The LLW and LLW RWM Process line and lift table locations accept bar code scans only from terminals 3 and 5. The TRU and TRU RWM Process line and lift table locations accept bar code scans only from terminals 4 and the Teklogix 9130 Radio Link Controllers and the Teklogix 9200 Network Controller are required to support portable bar code scanner operations.

7.2.1.1 Portable Scanner Configuration.

To access the configuration for the portable bar code scanners, press the ESC key three times, then press the A, B and C keys to toggle between the system menus and to return the configuration main menu.

There is no software configuration for the 9130 controllers; the only configuration necessary is the DIP switch settings.

To access the configuration for the 9200 network controller, a personal computer running a terminal emulation program, is required to be attached via serial cable to the configuration port on the back of the controller. Press the return key several times until the ">" prompt appears, then type "conf" and press return to enter the configuration menu.

7.2.1.2 Portable Bar Code Scanner Screen.

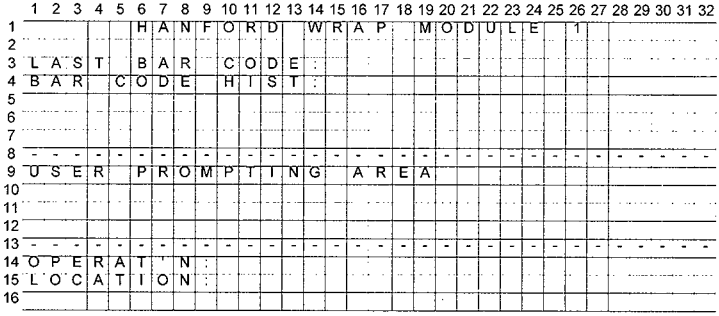
The default portable bar code scanner screen is shown in Figure 7-1. The screen is 32 columns wide by 16 lines (the grid lines are for design purposes and are not displayed on the screen).

The top of the screen displays the facility title, the last bar code PIN scanned and a history of up to the last four (4) bar code PINs scanned.

The middle area, delimited by "-", is reserved for user prompts and error messages. The prompts messages are defined in each PLC program file that uses the portable bar code scanners.

The bottom of the screen is reserved for status information: the current operation in progress and the current bar code scanner location. When a portable scanner is not linked to a PLC program file, the screen on the scanner will display the message "NO LOCATION DEFINED" in the center of the screen.

Figure 7-1. RF Bar Code Terminal Screen



7.2.2 Fixed Bar Code System

The fixed bar code system utilizes two types of fixed bar code terminals; Allen-Bradley 2755 fixed terminals and Allen-Bradley 2708 Attended Workstation wand terminals. The Allen-Bradley 2760-RB Flexible Interface Module (RB Module) is the communications "hub" for the fixed terminals. This module resides in the PLC rack of 104-CNR-12-103 (LCU 103).

7.2.2.1 RB Module Configuration.

To access the RB Module configuration, a personal computer running a terminal emulation program is required to be attached to the CONFIG port on the front panel of the RB Module via a null-modem serial cable. Default communications parameters are 9600 baud, 8 data pits, 1 stop bit, no parity. Press the BREAK key (Alt-B in PC Plus) to get the PRESS ANY KEY message, then press any key to enter the configuration mode.

7.2.2.2 Fixed Terminal Configuration.

To access the 2755 configuration, a personal computer running a terminal emulation program, is required to be attached to the AUX TERMINAL port on the top of the terminal via a serial cable. Default communication parameters are 9600 baud, 8 data bits, stop bit, no parity. Power the terminal down, and then power it up. The configuration menu should appear.

To access the 2708 configuration, power down the terminal, then, while pressing the Right Arrow and Enter buttons, power the terminal up. The configuration menus should now be accessible.

7.3 NETCOM/PLC BARCODE MESSAGE IDENTIFIERS

Listed in Table 7-1 are the bar code identifiers that are used by the PLC program files to determine the type of bar code that has been received (location, command or container PIN). The identifier enumeration is contained in the second word of the bar code messages received from Netcom.

Table 7-1. Bar Code Identifiers

#	Description	Enumeration
1.	Location Bar Code	10
2.	Command Bar Code	9
3.	Container PIN; See Table 7-7, below for a listing of container PINs	

7.4 LOCATIONS

Listed in Tables 7-2 through 7-5 are the valid locations within the WRAP 1 facility, including the location codes and enumerations.

Table 7-2. Shipping/Receiving Locations

#	Description	Code	Enumeration
1.	TRUPACT Payload Accumulation Conveyor 101-CV-05-104	ACCVYR	1
2.	AGV P&D at S&R Drum Discharge Conveyor 101-CV-05-102	AGVDISCVR	5
3.	AGV P&D at Empty Drum Infeed Conveyor 101-CV-05-105	AGVEMPINFC	7
4.	AGV P&D at S&R Drum Infeed Conveyor 101-CV-05-101B	AGVINFDC_B	9
5.	AS/RS Location	AS_RS	11
6.	S&R Drum Discharge Conveyor 101-CV-05-102	DISCHCVR	13
7.	S&R Drum Discharge Conveyor with Weigh Scale 101-CV-05-103B	DISCHCVRW	15
8.	Empty Drum Infeed Conveyor 101-CV-05-105	EMPINFDCVR	17
9.	Empty Drum Storage Area (On South Side Of AS/RS Shield Wall)	EMPSTR	19
10.	S&R Drum Infeed Conveyor 101-CV-05-101A	INFDCVYRA	21
11.	S&R Drum Infeed Conveyor 101-CV-05-101B	INFDCVYRB	23
12.	S&R Drum Weigh Scale Conveyor 101-CV-05-105A	INFDCVYRW	25
13.	AS/RS Pallet Stand	PSTND	27
14.	Wrap 1 Receiving Dock	RECDCK	29
15.	WRAP 1 Shipping Dock	SHPDCK	31
16.	SWB Storage Area On South Side Of As/Rs Shield Wall	SWBSTR	33
17.	TRUPACT Payload Staging Pallet Stand (Next To Discharge Conveyor)	TPSTAND	35
18.	AS/RS Transfer Car	XFRCAR	37
19.	Shipping Empty Drum Storage Area	SHIPEMPSTR	39
20.	TRU Bay	TRUBAY	41

Table 7-3. NDE/NDA Locations

#	Description	Code	Enumeration
1.	AGV P&D at Airlock Conveyor In NDE/NDA Area (Transfer To Process) CV-09-103A	AGVAIRC_A1	50
2.	AGV P&D at Airlock Conveyor in NDE/NDA area (Transfer To NDE/NDA) CV-09-103B	AGVAIRC_B3	52
3.	AGV P&D at Background Drum Storage Conveyor 104-CV-09-105A	AGVBDC_A	54
4.	AGV P&D at Background Drum Storage Conveyor 104-CV-09-105B	AGVBDC_B	56
5.	AGV P&D at Conveyor 104-CV-09-101E (for GEA_A)	AGVGEAC_A	58
6.	AGV P&D at Conveyor 104-CV-09-101F (for GEA_B)	AGVGEAC_B	60
7.	AGV P&D at NDE/NDA Carousel 104-CV-09-102	AGVN_NCRSL	62
8.	AGV P&D at Conveyor CV-09-101A (for NDE_A)	AGVNDEC_A	64
9.	AGV P&D at Conveyor CV-09-101B (for NDE_B)	AGVNDEC_B	66
10.	AGV P&D at Conveyor CV-09-101C (for PAN A)	AGVPANC_A	68
11.	AGV P&D at Conveyor CV-09-101D (for PAN B)	AGVPANC_B	70
12.	Background Drum Storage Conveyor 104-CV-09-105A	BDCVYR_A	72
13.	Background Drum Storage Conveyor 104-CV-09-105B	BDCVYR_B	74
14.	Box NDA Unit In The NDE/NDA Area	BOXNDA	76
15.	Box NDE Unit In The NDE/NDA Area	BOXNDE	78
16.	GEA Unit in general (104-ND-06-102 A or B) (for AGV communication)	GEA	80
17.	Eastern GEA Unit 104-ND-06-102A	GEA_A	82
18.	Conveyor 104-CV-09-101E (for GEA_A)	GEA_A_CVYR	84
19.	Western GEA Unit 104-ND-06-102B	GEA_B	86
20.	Conveyor 104-CV-09-101F (for GEA_B)	GEA_B_CVYR	88
21.	NDE/NDA Carousel 104-CV-09-102	N_NCRSL	90
22.	NDE Unit in general (104-ND-06-104A or B) (for AGV communication)	NDE	92
23.	Eastern NDE Unit 104-ND-06-104A	NDE_A	94
24.	Conveyor CV-09-101A (for NDE_A)	NDE_A_CVYR	96
25.	Western NDE Unit 104-ND-06-104B	NDE_B	98
26.	Conveyor CV-09-101B (for NDE_B)	NDE_B_CVYR	100
27.	PAN Unit in general (104-ND-06-101A or B) (for AGV communication)	PAN	102
28.	Eastern PAN Unit 104-ND-06-101A	PAN_A	104
29.	Conveyor CV-09-101C (for PAN A)	PAN_A_CVYR	106
30.	Western PAN Unit 104-ND-06-101B	PAN_B	108
31.	Conveyor CV-09-101D (for PAN B)	PAN_B_CVYR	110
32.	Airlock Conveyor In NDE/NDA Area (Transfer To Process) CV-09-103A	AIRCVYR_A1	112
33.	Airlock Conveyor In NDE/NDA Area (Transfer To NDE/NDA) CV-09-103B	AIRCVYR_B3	114
34.	Airlock Conveyor (in general for AGV communication)	AIRCVYR	116
35.	Shipping / Receiving / NDE / NDA AGV Battery Charging Location	AGV1BATT	118

Table 7-4. Process Area Locations

#	Description	Code	Enumeration
1.	Process Area AGV Battery Charging Location	AGV2BATT	150
2.	On AGV at Hold Point Loc, At West End Of Process Glovebox Lines	AGVHOLDPNT	152
3.	AGV P&D at LLW Entry Glovebox Port/Lift Table LT-09-202A	AGVLLWENTR	154
4.	AGV P&D at LLW Exit Glovebox Loadout Position/Lift Table LT-09-202C	AGVLLWEXIT	156
5.	AGV P&D at LLW RWM Compliant Waste Loadout Port/Lift Table LT-09-201E	AGVLLWRWCL	158
6.	AGV P&D at LLW RWM Transfer Drum Port/Lift Table LT-09-201F	AGVLLWRWEN	160
7.	AGV P&D at LLW RWM Treated Waste Loadout Port/Lift Table LT-09-201D	AGVLLWRWEX	162
8.	AGV P&D at LLW Transfer Port/Lift Table For RWM Transfer Drums LT-09-203A	AGVLLWRWX	164
9.	AGV P&D at RWM Carousel In Processing Area 107-CV-09-202	AGVRWMCRSL	166
10.	AGV P&D at 55-Gallon One Trip Drum Staging Conveyor 107-CV-09-204	AGVSTGC_55	168
11.	AGV P&D at 85-Gallon D&S Drum Staging Conveyor 107-CV-09-203	AGVSTGC_85	170
12.	AGV P&D at TRU Empty Drum Compaction Loadout Port/Lift Table LT-09-203C	AGVTRUCMPT	172
13.	AGV P&D at TRU Entry Glovebox Port/Lift Table LT-09-202B	AGVTRUENTR	174
14.	AGV P&D at TRU Exit Glovebox Loadout Position #1/Lift Table LT-09-202D	AGVTRULDO1	176
15.	AGV P&D at TRU Exit Glovebox Loadout Position #2/Lift Table LT-09-202E	AGVTRULDO2	178
16.	AGV P&D at TRU RWM Compliant Waste Loadout Port/Lift Table LT-09-201B	AGVTRURWCL	180
17.	AGV P&D at TRU RWM Transfer Drum Port/Lift Table LT-09-201C	AGVTRURWEN	182
18.	AGV P&D at TRU RWM Treated Waste Loadout Port/Lift Table LT-09-201A	AGVTRURWEX	184
19.	AGV P&D at TRU Transfer Port/Lift Table For RWM Transfer Drums LT-09-203B	AGVTRURWX	186
20.	Airlock Conveyor In Airlock (Transfer To Process) CV-09-104A	AIRCVYR_A2	188
21.	Airlock Conveyor In Process (Transfer To Process) CV-09-201A	AIRCVYR_A3	190
22.	Airlock Conveyor In Process Area (Transfer To NDE/NDA) CV-09-201B	AIRCVYR_B1	192
23.	Airlock Conveyor In Airlock (Transfer To NDE/NDA) CV-09-104B	AIRCVYR_B2	194
24.	LLW Entry Glovebox Port/Lift Table LT-09-202A	LLW_ENTRY	196
25.	LLW Exit Glovebox Loadout Position/Lift Table LT-09-202C	LLW_EXIT	198
26.	Exterior Of LLW Sorting Glovebox At Purge Port Location	LLW_PP	200
27.	LLW Exit Glovebox Puck Receipt Position	LLW_PUCK	202
28.	LLW Transfer Port/Lift Table For RWM Transfer Drums LT-09-203A	LLW_RWMPRT	204
29.	LLW Sorting Glovebox	LLW_SORT	206
30.	LLW Exit Glovebox Puck Storage Location #1	LLW_STORE1	208
31.	LLW Exit Glovebox Puck Storage Location #2	LLW_STORE2	210
32.	LLW Exit Glovebox Puck Storage Location #3	LLW_STORE3	212
33.	LLW RWM Glovebox Purge Port Location	LLWRW_PP	214
34.	LLW RWM Compliant Waste Loadout Port/Lift Table LT-09-201E	LLWRWCMPLT	216

Table 7-4. Process Area Locations

#	Description	Code	Enumeration
35.	LLW RWM Transfer Drum Port/Lift Table LT-09-201F	LLWRWENTRY	218
36.	LLW RWM Treated Waste Loadout Port/Lift Table LT-09-201D	LLWRWEXIT	220
37.	LLW RWM Glovebox Sample Location	LLWRWSAMPL	222
38.	LLW RWM Glovebox Treatment Location	LLWRWTREAT	224
39.	RWM Carousel In Processing Area 107-CV-09-202	RWM_CRSL	226
40.	LLW Exits (General, for AGV)	LLW_GENEXT	228
41.	55-Gallon One Trip Drum Staging Conveyor 107-CV-09-204	STGCVR_55G	230
42.	85-Gallon D&S Drum Staging Conveyor 107-CV-09-203	STGCVR_85G	232
43.	TRU Empty Drum Compaction Loadout Port/Lift Table LT-09-203C	TRU_COMPCT	234
44.	TRU Entry Glovebox Port/Lift Table LT-09-202B	TRU_ENTRY	236
45.	Entire TRU Glovebox (for fissile material alarms)	TRU_GLVEBX	238
46.	TRU Exit Glovebox Loadout Position #1/Lift Table LT-09-202D	TRU_LDOUT1	240
47.	TRU Exit Glovebox Loadout Position #2/Lift Table LT-09-202E	TRU_LDOUT2	242
48.	Exterior Of TRU Sorting Glovebox At The Purge Port Location	TRU_PP	244
49.	Entire TRU RWM Glovebox (for fissile material alarms)	TRU_RWMGB	246
50.	TRU Transfer Port/Lift Table For RWM Transfer Drums LT-09-203B	TRU_RWMPRT	248
51.	TRU Sorting Glovebox	TRU_SORT	250
52.	LLW Compactor	LLW_COMPCT	252
53.	TRU RWM Glovebox Purge Port Location	TRURW_PP	254
54.	TRU RWM Compliant Waste Loadout Port/Lift Table LT-09-201B	TRURWCMPLT	256
55.	TRU RWM Transfer Drum Port/Lift Table LT-09-201C	TRURWENTRY	258
56.	TRU RWM Treated Waste Loadout Port/Lift Table LT-09-201A	TRURWEXIT	260
57.	TRU RWM Glovebox Sample Location	TRURWSAMPL	262
58.	TRU RWM Glovebox Treatment Location	TRURWTREAT	264
59.	AGV P&D at Airlock Conveyor In Process (Transfer To Process) CV-09-201A	AGVAIRC_A3	266
60.	AGV P&D at Airlock Conveyor In Process Area (Transfer To NDE/NDA) CV-09-201B	AGVAIRC_B1	268
61.	TRU Exits (General, for AGV)	TRU_GENEXT	270

Table 7-5. Other Locations

#	Description	Code	Enumeration
1.	Unknown (used for AGV drum transfer commands)	UNKNOWN	300
2.	SIE Computer System (System Integration Equipment)	SIE	302
3.	Entire WRAP 1 Facility (for fissile material alarms)	FACILITY	304
4.	Waste Containers That are In Transit From WRAP 1	IN_TRANSIT	306

7.5 COMMANDS

Listed in Table 7-6 are all the valid bar code commands and their enumerations. The command enumeration is contained in the third word of the bar code message received from Netcom.

Table 7-6. PCS Bar Code Commands

#	Command	Description	Enumeration
1.	CNCL OPERATION	Current bar code activity is cancelled, next activity may commence.	902
2.	CNCL PREV READ	Cancel the previous container pin bar code read.	900
3.	END	Current bar code activity is completed, next activity may commence.	901
4.	NO	Abort current command	904
5.	RTV DRMPS	Retrieve drum from AS/RS to pallet stand (from processing pick list).	910
6.	RTV DRMPS1	Retrieve drum to pallet stand for LLW storage (from LLW Shipping Pick List).	912
7.	RTV DRMPS2	Retrieve drum to pallet stand for temporary TRU storage (from TRU shipping pick list).	913
8.	RTV DRMPS3	Retrieve drum to pallet stand for TRUPACT assembly (from TRU Shipping Pick List).	914
9.	RTV DRMTC	Retrieve drum to transfer car (from transfer car pick list).	911
10.	STR DRMPS	Store the drums on the pallet stand into the AS/RS unit	915
11.	STR DRMTC	Store drums from the transfer car location.	916
12.	TRUPACT ASSY COMPLETE	TRUPACT payload assembly complete.	917
13.	YES	Confirm current command	903
14.	RTV_INSP	Retrieve drum from AS/RS for inspection	918

7.6 CONTAINER PINS

Listed in Table 7-7 are all the valid bar code container PINs and their enumerations. The container PIN enumeration is an identifier enumeration and is contained in the second word of the bar code message received from Netcom.

Table 7-7. PCS Bar Code Container Pins

#	Container Pin	Description	Enumeration
1.	PURGE PORT PIN	Purge Port Container Pin	1
2.	TRANSFER PIG PIN	Transfer Pig Container Pin	2
3.	PACKET PIN	Waste Packet Pin, including Non-Compliant Items	3
4.	COLLECTION CONTAINER PIN	Aerosol Collection Container Pin	4
5.	TREATMENT CONTAINER PIN	Treatment Container Pin	5
6.	PUCK PIN	Compacted Puck Pin	6
7.	DRUM / BOX PIN	Drum Or Box Container Pin	7
8.	SAMPLE PIN	Sample Container Pin	8

7.7 BAR CODE SEQUENCES

This section describes the WRAP bar code sequences.

7.7.1 General Bar Code Sequences

Completing a bar code sequence, canceling a sequence, and other bar code scanner operations have been standardized for nearly every bar code sequence. Descriptions for these standard sequences are provided below. Exceptions to these general rules are covered in individual bar code sections.

7.7.1.1 General Use Bar Code Commands.

Several bar code commands are used in all areas of WRAP to support bar code operations. These commands are listed in Table 7-8.

Table 7-8. General Use Bar Code Commands

Command	Description
CNCL OPERATION	Cancel current operation
CNCL PREV READ	NOTE: This command ONLY applies to drum pins, not to

Table 7-8. General Use Bar Code Commands

Command	Description
	commands. Use to cancel the previous drum PIN bar code read.
END	Current bar code activity is completed, transmit data to DMS
NO	Aborts the current operation
YES	Confirms the current operation

7.7.1.2 Container Location Update Sequence.

This sequence applies to either fixed or portable bar code scanners, depending on the location.

Fixed bar code scanners do not require any action to establish location. Container location update sequences that use a fixed bar code scanner usually require only a scan of the container pin. The container pin is checked against error criteria, and if no errors are noted, the sequence is complete.

When a portable bar code scanner is used, a location update sequence is initiated by establishing the location of that bar code scanner. The location bar code is scanned, followed by the waste container bar codes for that sequence. After the location and drum pins are established, any required commands (e.g., store and retrieve) are scanned. The container pin, or pins, are checked against error criteria, and if no errors are noted, the container location update sequence may be completed.

7.7.1.3 Successfully Completing a Bar Code Operation.

This sequence applies to portable bar code scanners only.

After all necessary bar codes have been scanned, scanning the "END" followed by the "YES" command bar code successfully completes portable bar code sequences.

After the "END" bar code is scanned, the portable scanner displays a prompt indicating that either the "YES" bar code must be scanned to complete the operation or the "NO" bar code must be scanned to allow the operation to continue. If the "YES" bar code is successfully scanned, the sequence is successfully completed and the bar code scanner display is reset. If the "NO" bar code is scanned, the operation continues until completed or cancelled.

7.7.1.4 Canceling a Bar Code Operation.

This sequence applies to portable bar code scanners only.

Two options are provided for canceling bar code sequences:

In all plant areas, the "CANCEL OPERATION" command is provided. To cancel a bar code operation, the "CANCEL OPERATION" bar code is scanned, followed by the "YES" bar code.

After the "CANCEL OPERATION": bar code is scanned, the portable scanner displays a prompt indicating that either the "YES" bar code must be scanned to cancel the operation or the "NO" bar code to continue the operation. If the "YES" bar code is scanned, the sequence is cancelled and the bar code scanner display is reset. If the "NO" bar code is scanned, the operation simply continues.

In the Shipping/Receiving and NDE/NDA areas, where multiple drums may be associated with a single bar code sequence, an additional "CANCEL PREVIOUS READ" option is provided. Scanning the "CANCEL PREVIOUS READ" bar code followed by the "YES" bar code, causes the most recently scanned container pin to be deleted from the sequence. After the "CANCEL PREVIOUS READ": bar code is scanned, the portable scanner displays a prompt indicating that either the "YES" bar code must be scanned to cancel the previous container pin read or the "NO" bar code to continue the operation without change. If the "YES" bar code is scanned, the most recently scanned container pin is deleted from the sequence and the sequence continues. If the "NO" bar code is scanned, the operation simply continues. This sequence may be repeated for multiple drum pins until all of the drum pins associated with a bar code sequence have been deleted.

7.7.1.5 `Bar Code Reader Prompts.

Every bar code sequence requires that certain types of bar codes be scanned in a strict sequence. If the required sequence is violated, an error prompt may be displayed. (See Table 7-9)

Table 7-9. Bar Code Error Prompts

Prompt	Description
INVALID TERMINAL ID#	Portable bar code scanners are associated with distinct locations. If an attempt is made to use a portable scanner with and location that scanner is not associated with, this prompt will be displayed.
COMMAND NOT RECOGNIZED	The bar code scanned does not match the type of bar code required for the operation. For example, if a portable scanner is used to scan a container bar code, this prompt will be displayed because a location bar code must be scanned first in order to establish the location of the portable scanner. Similarly, scanning the "CANCEL PREVIOUS READ" bar code before any drums are scanned during a sequence will cause this prompt to be displayed.
DRUM PIN MISMATCH	The container pin scanned was not found in the drum pin tracking table, did not match the drum pin associated with the location, or otherwise violated error criteria. In most cases, a "Drum Pin Mismatch" requires cancellation of the bar code sequence in progress.
BARCODE ERROR	Generic bar code error. This error prompt is generated by incorrect bar code scans or by scanning a bar code out of sequence. This error is similar to the "COMMAND NOT RECOGNIZED" error.
COMMAND ABORTED	This error is generated by scanning a "NO" bar code after an END, CNCL PREV READ, CNCL OPERATION (or TRUPACT ASSY COMPLETE) bar code. In this condition, the current command will be aborted and "COMMAND ABORTED" prompt is displayed.

7.7.2 Shipping and Receiving Area

7.7.2.1 Receiving Dock.

All containers but transfer drums are brought into the facility only through the receiving dock. This includes boxes, empty drums, and waste containers. Transfer drums do not go through the receiving dock because their entire life cycle begins and ends within the process area.

The Receiving Dock drum location update sequence is initiated by scanning a RECDCK (Receiving Dock) location bar code with a portable scanner. After scanning RECDCK, the bar codes of the containers to be received are scanned. PINs scanned are saved in a temporary area on PLC 101 called the "Receiving Area" (when the receipt is completed the PINs are moved to the Received Area). Up to 50 drums can be scanned for a single receipt, and two simultaneous receipts can be handled by the bar code/PLC system. After the container PINs are scanned and END/YES commands scanned, the location (RECDCK) and scanned drum PINs are transmitted to the DMS, via the Container Location message (Netcom 5.3.1).

The drum PINs are received by the DMS and saved in the RECDISP table on the DMS. The container data is reviewed for acceptability. When empty drums are received, the DMS prompts the user for a route. When it is determined that the container data is acceptable, the DMS sends the Container Location message 5.4.1 (Netcom message 5.4.1) to the PCS with the accepted PINs. This message causes the scanned drum PINs to be deleted from the temporary Receiving Area on PLC 101 and copied to the Received Area in PLC 104.

From the receiving dock, empty containers are scanned into the empty drum storage area (EMPSTR), boxes are scanned into the box storage area (SWBSTR), and waste containers are either loaded onto the infeed conveyor or stored in the AS/RS, depending on process route.

7.7.2.2 Drum Scale Conveyor A.

Drum Scale conveyor B utilizes fixed bar code scanner (104-NT/NE-12-102). This scanner supports two lines of display text. If the drum pin matches at least one drum pin in the Infeed Staging Area data table or Received Area table, it is "accepted" and that drum pin and the associated drum weight is displayed on the reader. If there is no match the reader displays a Drum PIN Mismatch error. Portable bar code readers (Units 1 or 2) also work at this position but the scanner display is not updated as it is at other locations.

7.7.2.3 Drum Scale Conveyor B.

Drum Scale Conveyor B drum location update sequence is initiated by scanning a DISCHCVRW location bar code. A drum pin is the next bar code expected. If a drum PIN is scanned, the PIN is compared to the drum PIN in the drum scale conveyor B drum tracking table, which was updated when the drum was indexed from the discharge conveyor onto the scale conveyor. If the drum PINs are identical, the drum weight will be read from the weight transmitter and operations may continue. When the drum location update sequence is completed at the Drum Scale Conveyor B, the drum PIN, drum weight and location (DISCHCVRW) are sent to the DMS, via the Container Location with Weight message (Netcom message 5.3.2).

7.7.2.4 Shipping Dock Area.

The shipping dock is the final location for a container before it is shipped from the facility. There are three shipping dock areas; one for empty drums, SHIPEMPSTR, one for waste drums, SHPDCK, and one for boxes, SWBSTR. Once the SHPDCK, SWBSTR, or SHIPEMPSTR location bar code and the END/YES sequence has been received, the PCS sends a container location message (Netcom 5.3.1).

The PINs on all three shipping areas are displayed in real time application platform (RTAP) in the Shipping/Receiving area. This is the last point where the PCS is involved with these drums. The DMS handles final transfer of data to SWITS then ultimately sends a 5.4.1 message with location "IN_TRANSIT" to the PCS.

7.7.2.5 Empty Drum Infeed Conveyor.

All empty containers to be used in the process area (except for the transfer drums) go through the empty infeed conveyor. The empty infeed has location "EMPINFDCVR". Drums can be loaded on to the empty infeed either one at a time from the AGV end, or at a minimum of eight drums from the crane side. The conveyor is a non-indexing forward/reverse conveyor. This means that all drums are on a single conveyor and all move forward or backwards together. A second set of photo-eyes is used on each end as indexing photo-eyes when loading and unloading drums. The photo eyes are placed far enough apart so as to support either 55 or 85 gal. drums.

The programmable logic controller (PLC) logic is designed so that when the conveyor is loaded with drums, the reverse button can be pushed and the drums will move back one drum position so that the automatically guided vehicle (AGV) end drum is just breaking the second photo eye. This enables placing a drum on the AGV end in case there is an urgent need for this size container. A ninth drum can be loaded on the crane side, but this will disable the ability to index backwards and place a single drum on the AGV end.

In the single drum mode, a single drum is placed on the AGV end and the AGV pickup switch is in the DISABLE position. The EMPINFDCVR bar code is scanned, then the PIN, then the END/YES commands. In the multiple drum mode, a single drum is loaded on the crane end. The EMPINFDCVR bar code is scanned, then the PIN, then the END/YES commands. This enables pressing the FORWARD button, which indexes the drum forward one drum position until the drum just clears the crane end indexing photo eye. This process is continued until the eighth drum is indexed forward which locates the first drum on the AGV end of the conveyor where it can be picked up. Setting the AGV pickup switch to the ENABLE position then enables pickups from the conveyor.

7.7.2.6 Automated Stacker Retriever System.

Several sequences are initiated after one of the Automated Stacker Retriever System (AS/RS) command bar codes are scanned (or upon the receipt of a Netcom message from the AS/RS). The following bar code sequences occur at the AS/RS locations:

Retrieve Drum From AS/RS To Pallet Stand (From Processing Pick List)

Drum retrieval is started by scanning the pallet stand location PSTND. If there are already three pallets scanned to the pallet stand the bar code scanner displays message "INFEED STAGING FULL". If there are less than 3 pallets at the pallet stand, the RTV DRMPS bar code is scanned to retrieve a drum from the AS/RS to the pallet stand. The PCS then sends the Drum to Retrieve to Pallet Stand message (Netcom message 5.7.6) to the AS/RS for the first drum in the process pick list.

When the pallet has been successfully retrieved from the AS/RS, the processing of the PINs on the pallet starts. The PCS scans the drums retrieved to the pallet stand one by one to determine if they are on the pick list or not. If the drum is on the pick list the PCS finds an empty slot (the first word of the drum pin is 0) in the infeed staging area table and stores the PIN in the empty slot. If the drum is not found on the pick list the float table is scanned for an empty slot and the PIN is stored in the float table.

Retrieve Drum To Pallet Stand For LLW Storage (From LLW Shipping Pick List)

The RTV DRMPS1 bar code is scanned to retrieve a drum from the AS/RS to the pallet stand for LLW storage. If this sequence is successfully completed, the ID of Drum to Retrieve to Pallet Stand message (Netcom message 5.7.6) is sent to the AS/RS for the next drum PIN in the LLW Shipping Pick List drum PIN table.

Retrieve Drum To Pallet Stand For Temporary TRU Storage (From TRU Shipping Pick List)

The RTV DRMPS2 bar code is scanned to retrieve a drum from the AS/RS to the pallet stand for temporary TRU storage. If this sequence is successfully completed, the ID of Drum to Retrieve to Pallet Stand message (Netcom message 5.7.6) is sent to the AS/RS for the next drum PIN in the TRU Shipping Pick List drum PIN table.

Retrieve Drum To Transfer Car (From Transfer Car Pick List)

The RTV DRMTC bar code is scanned to retrieve a drum from the AS/RS to the transfer car. If this sequence is successfully completed, the ID of Drum to Retrieve to Transfer Car message (Netcom message 5.7.10) is sent to the AS/RS for the drum PIN in the Transfer Car Pick List drum PIN table.

Store The Drums From The Pallet Stand Into The AS/RS Unit

Drum storage from the pallet stand is started by scanning the pallet stand location bar code (PSTND) then the PINs of the drums to be stored. The STR DRMPS bar code is then scanned to store drums on the pallet stand to the AS/RS. When this bar code is scanned after at least (1) drum PIN has been scanned, the PCS will search the scanned drum PINs in the Received Drums

drum PIN table, the float table, and, if necessary, in the Infeed Staging Area drum data table, to verify that the scanned drum PINs are valid. If the drum PINs are found, the file will issue Drums to Store at Pallet Stand message (Netcom message 5.7.5) to the AS/RS for the scanned drum PINs, and the drum PINs will be deleted from the table in which they were found. If the drum PINs are not found in either of the tables, the STR DRMPS Drum PIN Mismatch alarm will be set.

Store The Drums From The Transfer Car Into The AS/RS Unit

A transfer car store is started by scanning the transfer Car location bar code (XFRCAR) then the PINs of the drums to be stored. The STR DRMTC bar code is scanned to store drums on the transfer car in the AS/RS. If this bar code is scanned after at least (1) drum PIN has been scanned, the PINs of Drums to Store from Transfer Car message (Netcom message 5.7.11) is sent to the AS/RS. The Transfer Car location is one of the few places where the PCS does no checking to see if the drum PIN is valid before accepting the drum PIN.

If one of the store commands (STR DRMPS or STR DRMTC) is received and the number of drum PINs received is less than four (4), "<4 DRUM PINS ENTERED" will be displayed, along with the prompt to confirm the current operation. If, during a store operation, the operator scans a fifth drum PIN, then ">4 DRUM PINS ENTERED" will be displayed and the scanned PIN will not be added to the temporary drum PIN table.

7.7.3 Nondestructive Examination/Assay Area

7.7.3.1 Box Waste Assay System

NOTE: Box pins are identical in format to drum pins.

The box location update sequence is initiated by scanning the BOXNDA location bar code. If a Box PIN is then scanned, the PIN is copied into the BWAS data table and Box Present bit is set. If the box location update sequence is successfully completed, a Container Location Update message is issued (Netcom message 5.3.1) for the box PIN with BOXNDA as the location.

7.7.3.2 Box Nondestructive Examination.

The box location update sequence is initiated by scanning the Box Nondestructive Examination (BOXNDE) location bar code. If a Box PIN is then scan, the PIN is copied into the Box NDE PIN table and the weight is read from the weight transmitter and is copied into the Box NDE data table. If the sequence is successfully completed, the file will issue a Container Location with Weight message (Netcom message 5.3.2).

7.7.3.3 Gamma Energy Analysis.

There are no bar code locations defined for the Gamma Energy Analysis (GEA) systems. Drum PINs are transferred through messages coordinated through the PCS, DMS, and AGVCS.

7.7.3.4 Passive/Active Neutron Analysis.

There are no bar code locations defined for the Passive/Active Neutron Analysis (PAN) systems. Drum PINs are transferred through messages coordinated through the PCS, DMS, and AGVCS.

7.7.3.5 Drum Nondestructive Examination.

There are no bar code locations defined for the drum nondestructive examination (NDE) systems. Drum PINs are transferred through messages coordinated through the PCS, and AGVCS.

7.7.4 Waste Process Area

The WRAP "Process Area" includes all equipment items in room 107.

7.7.4.1 Lift Tables.

The lift table bar code sequences verify the PIN of each drum dropped-off at a lift table. The drum location update sequence is initiated when a valid lift table location bar code is scanned.

If a drum PIN is scanned, the PIN will be compared to the PIN in the drum data table for the current lift table. If the PINs are identical, "DRUM PIN VERIFIED" will be displayed and operations may proceed. If the PINs do not match, a prompt indicating "DRUM PIN MISMATCH" will be displayed.

If the sequence is successfully completed, the Container Location Update message (Netcom message 5.3.1) is sent to the DMS.

7.7.4.2 LLW Sorting Glovebox.

Packet, sample, and transfer container bar code sequences are supported at the LLW Sorting Glovebox.

When a packet PIN is scanned at the LLW Sorting Glovebox location, the packet PIN is stored into the RW Packet PIN table. If the sequence is successfully completed, the Restricted Waste Packet and Parent Drum Relationship (Netcom message 5.3.6) and the Restricted Waste Packet and Transfer Drum Relationship messages (Netcom message 5.3.5) are sent to the DMS.

When a sample PIN is scanned at the LLW Sorting Glovebox location, the sample PIN is stored into the Sample PIN table. If Sample Loadout has not been selected at the OIU, then the Sample and Parent Drum / Packet Relationship message (Netcom message 5.3.8) is sent to the DMS. If Sample Loadout has been selected at the OIU, then the Sample and Purge Port Relationship message (Netcom message 5.3.9) is sent.

Transfer port location updates are initiated by scanning the LLW_PP location bar code, followed by a Purge port PIN and optionally a Transfer Pig PIN. If the Transfer Port location update sequence is successfully completed, one of two messages will be sent to the DMS. If a Transfer Pig PIN was scanned as part of the sequence, the Purge Port and Transfer Pig Relationship message (Netcom message 5.3.10) will be sent to the DMS. If only a Purge Port PIN has been scanned, then the Purge Port Location Update message (Netcom message 5.3.7) will be sent.

7.7.4.3 LLW Exit Glovebox.

After a drum puck is transferred to the LLW Exit Glovebox, the puck is labeled and scanned using the wand scanner (107-NE-12-312). If this sequence is successfully completed, the puck location is established at the Compact Receipt location and the Waste Container Location Update message (Netcom 5.3.1 message) is sent to the DMS.

7.7.4.4 TRU Sorting Glovebox.

Packet bar code sequences are supported at the TRU Sorting Glovebox.

When a packet PIN is scanned at the TRU Sorting Glovebox location, the packet PIN is stored into the RW Packet PIN table. The packet is then assayed and the TRU Packet Assay Monitor Results message (Netcom message 5.3.21) is sent to the DMS. At the completion of the assay, the packet can be selected for either loadout in the transfer drum (Port 107-DO-07-305) or for return to the sorting table. If the packet is selected for loadout, the Restricted Waste Packet and Parent Drum Relationship (Netcom message 5.3.6) and the Restricted Waste Packet and Transfer Drum Relationship messages (Netcom message 5.3.5) are sent to the DMS.

7.7.4.5 TRU Waste Loadout Glovebox.

Sample and transfer container bar code sequences are supported at the TRU Waste Loadout Glovebox.

When a sample PIN is scanned at the TRU Sorting Glovebox location, the sample PIN is stored into the Sample PIN table. If Sample Loadout has not been selected at the OIU (OIU-12-104D), then the Sample and Parent Drum / Packet Relationship message (Netcom message 5.3.8) is sent to the DMS. If Sample Loadout has been selected at the OIU, then the Sample and Purge Port Relationship message (Netcom message 5.3.9) is sent.

Transfer port location updates are initiated by scanning the LLW_PP location bar code, followed by a Purge port PIN and optionally a Transfer Pig PIN. If the Transfer Port location update sequence is successfully completed, one of two messages will be sent to the DMS. If a Transfer Pig PIN was scanned as part of the sequence, the Purge Port and Transfer Pig Relationship message (Netcom message 5.3.10) will be sent to the DMS. If only a Purge Port PIN has been scanned, then the Purge Port Location Update message (Netcom message 5.3.7) will be sent.

7.7.4.6 LLW RWM and TRU RWM Gloveboxes.

The bar code operations at the LLW RWM and TRU RWM are quite similar. Each glovebox has two different locations for bar code operations; the sample and the treatment locations. The operations supported at each location differ.

At the RWM Glovebox sample location, the following operations are supported:

Adding And Removing Items From The Transfer Stand

When removing items from the transfer stand via Operator Interface Unit (OIU) selection and a non-compliant item / packet PIN is scanned, the PIN is copied into the next position of the transfer stand packet PIN table. Then, the Remove Items From Transfer Stand message (Netcom message 5.3.13) is sent to the DMS. When adding items to the transfer stand via OIU selection and a non-complaint item / packet PIN is scanned, the Add Items To Transfer Stand message (Netcom message 5.3.14) is sent to the DMS. The PIN is removed from the transfer stand packet PIN table.

Identifying Noncompliant Items in Packet

When not removing items from the transfer stand and a non-compliant item / packet PIN is scanned, the file searches the transfer stand packet PIN table for the scanned PIN to verify that the packet was previously removed from the transfer stand.

After a valid packet PIN has been scanned and another non-compliant item / packet PIN is scanned, the file compares this PIN to the valid packet PIN. If the PINs do not match, then this PIN is a valid non-compliant item PIN and the Non-Compliant Item and Packet Relationship message (Netcom message 5.3.15) is sent to the DMS.

Identifying Sample and Parent Item Relationships

After a valid packet PIN has been scanned and a sample PIN is scanned, and Sample Loadout has not been selected at the OIU, the Sample and Parent Drum / Packet Relationship message (Netcom message 5.3.8) is sent to the DMS.

Loadout Samples

When a sample PIN is scanned after "Sample Loadout" is in progress (via OIU selection), the Sample and Purge Port Relationship message (Netcom message 5.3.9) is sent to the DMS.

Transfer port location updates are initiated by scanning the appropriate purge port location bar code (i.e., LLWRW_PP or TRURW_PP), followed by a Purge port PIN and optionally a Transfer Pig PIN. If the Transfer Port location update sequence is successfully completed, one of two messages will be sent to the DMS. If a Transfer Pig PIN was scanned as part of the sequence, the Purge Port and Transfer Pig Relationship message (Netcom message 5.3.10) will be sent to the DMS. If only a Purge Port PIN has been scanned, then the Purge Port Location Update message (Netcom message 5.3.7) will be sent.

At the treatment location, the following operations are supported:

Presenting a Packet for Treatment
When a non-compliant item / packet PIN is scanned, and Treated Item Loadout has not been selected at the OIU, and a treatment container PIN has not been scanned, the Non-Compliant Items Presented for Treatment, Request DMS Display Instructions message (Netcom message 5.3.17) is sent to the DMS.

Presenting a Sample for Treatment
If a sample PIN is scanned and Treated Item Loadout has not been selected and a treatment container has not been scanned, the PIN is copied into the sample PIN table. Then, the Sample Presented for Treatment and Purge Port Relationship message (Netcom message 5.3.18) is sent to the DMS.

Adding an Item to a Treatment Container
Non-compliant items are associated with treatment containers at the Treatment Location. This sequence is possible only when "Treated Item Loadout" is not in progress. To associate a packet with a treatment container, the treatment container PIN is scanned, immediately followed by the non-compliant item / packet PIN. If this sequence is successfully completed, the Treatment Container and Item Container Relationship message (Netcom message 5.3.19) is sent to the DMS.

Loading out Treated Items
When a non-compliant item / packet PIN is scanned, or if a treatment container PIN is scanned, and Treated Item Loadout has been selected at the OIU, the PIN is copied to its PIN table. Then, the Treatment Container and Loadout Drum Relationship message (Netcom message 5.3.20) is sent to the DMS.

Table of Contents

List of Figures

List of Tables

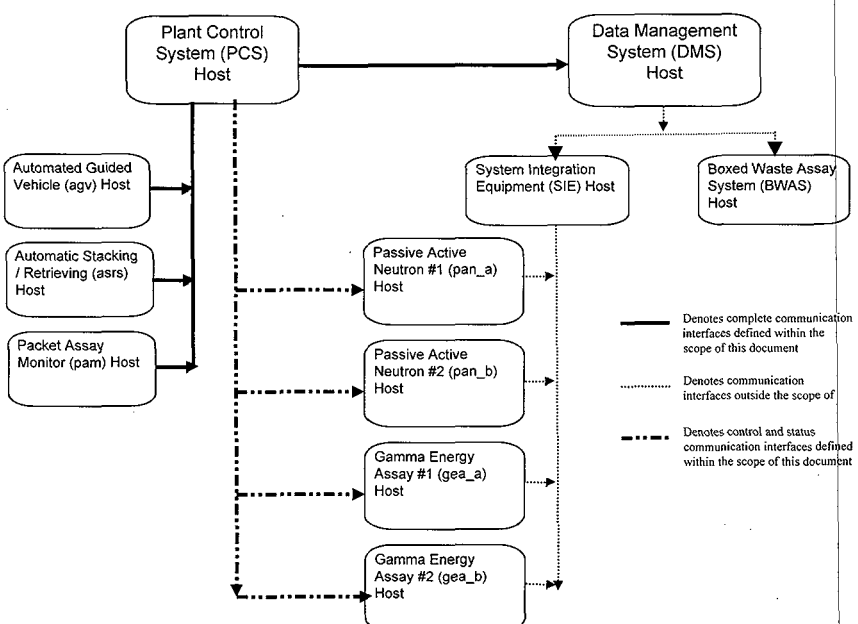
List of Tables

8.0 COMMUNICATIONS PROTOCOL DEFINITION DOCUMENT

8.1 INTRODUCTION

The entire network is physically organized as an Ethernet "star" through a Router / Hub such that any host computer can connect to any other. A network organization graph, below, illustrates commands and data that can be expected between host computers. The Plant Control System (PCS) will have communications routines programmed that allow for data transfer between itself and the DMS, AGV, ASRS, PAN, GEA, or PAM host systems. When a Passive Active Neutron or Gamma Energy Assay host computer sends information to the Data Management System (DMS), it first sends messages to the System Integration Equipment (SIE) computer, which will then transmit the data to the Data Management System host which may also re-transmit the information to the PCS (criticality alarms, for example). Control and status signals to the PAN and GEA systems will be directly sent from the PCS. The SIE and BWAS host systems communicate only to the DMS system. Figure 8-1 illustrates this configuration.

Figure 8-1. NETCOM Communications Overview



8.1.1 Purpose

The purpose of the interface definition document is to provide a complete and detailed definition of the Waste Receiving and Processing (WRAP) Local Area Network (WLAN) communications interface between the Plant Control System (PCS) and Data Management System (DMS). Additionally, communications between the PCS and Automated Guided Vehicle (AGV), Automated Stacking and Retrieving System (AS/RS), and TRU Packet Assay Monitor are described along with control and status interface communications to the GEA and PAN systems.

8.1.2 Scope

Interfaces between these systems are described in terms of protocols, information transfer, sequences, initialization, and recovery from errors.

Only interfaces involving the PCS are considered. Interfaces with operators and other systems are excluded from this document. Interface with the Local Control Units occurs through the commercial "NetDTL" driver supplied by Allen-Bradley for use with Hewlett-Packard's Real Time Applications Platform (RTAP) product. RTAP executes on the PCS system and creates the operator interface displays on the Operator Control Stations. RTAP is configured to directly access internal PLC registers via "NetDTL" and this mapping will be described in the Detailed Software Design Description.

8.2 INFORMATION TRANSFER

8.2.1 Overview

This section defines the structure of each type of message, which may be sent between subsystems. Each message contains a series of fields, each of which is formatted as ASCII character strings and XDR numeric representations. Message types are transmitted as a 4 character strings which facilitates maintenance and debugging as display of the raw data streams are easily understood without having to reference enumerated types through tables. Conversion of these strings to and from internal program enumeration constants (through 'C' program sprintf, sscanf, strncmp statements and table lookups) is easily implemented and does not consume much CPU time. It is even possible to "cast" the 4 byte string to an integer (or 8 byte string to a long int) resulting in instantaneous conversion to a pre-defined enumerated numeric types within a program. This technique also facilitates some programming on the DMS system as the Oracle SQL database will use character-based information storage (such as 10 char location strings). When values need to be transmitted in a machine native format, XDR representations are used, some of which are described below.1 TCP packet lengths are variable so there are no compelling reasons to keep all message packets to a particular fixed size.

The first field in a message indicates the general message type. This is a string acronym entry of maximum length 8, which can take one of the following values:

PCSDMS	= PCS sending database values to DMS
PCSRDMS	= PCS requesting an action from the DMS
DMSPCS	= DMS sending data to the PCS
PCSAGV	= PCS sending data to the AGV
PCSRAGV	= PCS requesting an action from the AGV
AGVPCS	= AGV sending data to the PCS
AGVRPCS	= AGV requesting an action from the PCS
PCSASRS	= PCS sending data to the AS / RS
PCSRASRS	= PCS requesting an action from the AS / RS
ASRSPCS	= ASRS sending data to the PCS
PCSPAM	= PCS sending data to the PAM
PCSRPAM	= PCS requesting an action from the PAM
PAMPCS	= PAM sending data to the PCS
PCSRPAN	= PCS requesting an action from a PAN unit (A or B)
PANPCS	= PAN unit (A or B) sending data to the PCS (status)
GEAPCS	= GEA unit (A or B) sending data to the PCS (status)
PCSRGEA	= PCS requesting an action from a GEA unit (A or B)

The second field in a message is always the specific message or command type. This is also an ASCII character string acronym entry of maximum length 4, which can take on many different values.

In some circumstances, for example if some data is unavailable, a field in a message may be invalid. Although the subsystems receiving the message will ignore the contents of such a field, the contents should be set to NUL characters (ASCII 0) to ensure consistency.

8.2.2 Data Types

The data types used in the messages are briefly described below. All of the message content is transmitted in both character string arrays and XDR representations. Additionally, if used, numbers are formatted to strings for transmission and shown with a format described below.

`string<n>` string type.
A series of ASCII characters, with a maximum length of n characters. 'n' is defined to be a number evenly divisible by four and padded to length n with NUL characters (ASCII 0 value). There is no guarantee that the character string will end in a NUL character so fixed fields must be assumed. If the string is shown as `string<n.m>`, the n corresponds to the length of the string and the m corresponds to the number of decimal digits. Thus string<10.2> represents numbers in the form of ########.##

`int` XDR signed integer type

A 32-bit (four byte) signed integer, represented in two's complement notation. The range is -2^{31} to $(2^{31} - 1)$

In XDR, integers are represented in "big endian" order with the most significant byte in the lowest memory address).

`double` XDR double precision floating point type.
A 64-bit (eight byte) floating point number, conforming to the IEEE standard for normalized floating-point numbers.

`time_t` XDR unsigned integer type.
A 32-bit (four byte) unsigned integer value representing a date and time. The value is the number of seconds elapsed since January 1, 1900. This is equivalent to the time_t defined by UNIX and ANSI-C standards.

The following tables, Table 8.3-1 through Table 8.3-12, describe the format for all NETCOM messages. The following tables, Table 8.4-1 through Table 8.4-12, describe the internal PLC format for all NETCOM messages.

8.3 NETCOM MESSAGE FORMATS

Table 8.3-1 NETCOM Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.3.1	Waste Container Location Update	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	CL = CONTAINER_LOCATION
		3	Date / Time	time_t<4>	XDR format
		4	Container(s) Location	string<12>	See list of locations and acronyms
		5	Pallet Bin Location	string<4>	Valid only when Containers stored at AS/RS Format described at end of Table 8-1-6
		6	Number Containers	int<4>	XDR signed int (Count of Containers following)
		7	Container Identifications	string<16>	Bar Code label, may be padded with NUL's This field is repeated NumberContainer times.
5.3.2	Waste Container Location with Container Weight	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	CLW = CONTAINER_LOCATION_WEIGHT
		3	Date / Time	time_t<4>	XDR format
		4	Container(s) Location	string<12>	See list of locations and acronyms
		5	Number Containers	int<4>	XDR signed int (Count of Containers following)
		6	Container Identifications	string<16>	Bar Code label, may be padded with NUL's This field is repeated NumberContainer times.
		7	Drum Weight	double<8>	Weight transmitted is in Kilograms. Errors in weight transmitter are sent as 0 - Repeated Field
5.3.3	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.3.4	Overpack Drum Contamination Status	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	DCS = DRUM_CONTAMINATION_STATUS
		3	Date / Time	time_t<4>	XDR format
		4	Drum Location	string<12>	Only LLW_ENTRY or TRU_ENTRY valid
		5	Drum Identification	string<16>	Bar Code label
		6	Contamination Status	string<4>	TRUE ('T') or FALSE ('F')
5.3.5	Restricted Waste Packet and Transfer Drum Relationship (Sent AFTER msg 5.3.6)	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	RWPT=RW_PACKET_AND_TRNSFR_DRUM
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	RW Packet Identification	string<16>	Bar Code label
		6	RW Transfer Drum ID	string<16>	Bar Code label

Table 8.3-1 NETCOM Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.3.6	Restricted Waste Packet and Parent Drum Relationship (Sent BEFORE msg 5.3.5)	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	RWPP=RW_PACKET_AND_PARENT_DRUM
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	RW Packet Identification	string<16>	Bar Code label
		6	RW Parent Drum ID	string<16>	Bar Code label
5.3.7	Purge Port Location Update	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	PPL=PURGE_PORT_LOCATION
		3	Date / Time	time_t<4>	XDR format
		4	Purge Port Location	string<12>	See list of locations and acronyms
		5	Purge Port Identification	string<16>	Bar Code label
5.3.8	Sample and Parent Drum / Packet Relationship	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	SPDP=SAMPLE_AND_PARENT_DRUMPACK
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Sample Identification	string<16>	Bar Code label, Note: only 12 used for samples
		6	Parent Drum / Packet ID	string<16>	Bar Code label
5.3.9	Sample and Purge Port Relationship	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	SPP=SAMPLE_AND_PURGE_PORT
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Sample Identification	string<16>	Bar Code label, Note: only 12 used for samples
		6	Purge Port ID	string<16>	Bar Code label
5.3.10	Purge Port and Transfer PIG Relationship	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	PPTP=PURGE_PORT_AND_TRANSFER_PIG
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Purge Port Identification	string<16>	Bar Code label
		6	Transfer PIG ID	string<16>	Bar Code label
5.3.11	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	

Table 8.3-1 NETCOM Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.3.12	Puck and Overpack Drum Relationship	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	POPD=PUCK_AND_OVERPACK_DRUM
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Puck Identification	string<16>	Bar Code label, Note: Puck ID's are 6 chars
		6	Overpack Drum ID	string<16>	Bar Code label
5.3.13	Remove Items from Transfer Stand	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	REMT=REMOVE_FROM_TRANSFER_STAND
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	RWM Xfer Drum ID	string<16>	Bar Code label
		6	Item Identification	string<16>	Bar Code label
5.3.14	Add Items to Transfer Stand	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	ADDT=ADD_TO_TRANSFER_STAND
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	RWM Xfer Drum ID	string<16>	Bar Code label
		6	Item Identification	string<16>	Bar Code label
5.3.15	Non-Compliant Item and Packet Relationship	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	NCIP=NON_COMPLIANT_ITEM_AND_PACKET
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Item Identification	string<16>	Bar Code label
		6	Packet Identification	string<16>	Bar Code label
5.3.16	Aerosol Can to Collection Container Relationship	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	ACC=AEROSOL_CAN_AND_CONTAINER
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Aerosol Can ID	string<16>	Bar Code label
		6	Collection Container ID	string<16>	Bar Code label

Table 8.3-1 NETCOM Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.3.17	Non-Compliant Items Presented for Treatment, request DMS Display instructions	1	Message General Type	string<8>	PCSRDMS = PCS_ REQUEST_TO_DMS
		2	Message Specific Type	string<4>	NCIT = NON_COMPLIANT_ITEM_TREATED
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Item Identification	string<16>	Bar Code label
5.3.18	Samples Presented for Treatment and Purge Port Relationship	1	Message General Type	string<8>	PCSDMS = PCS_ DATA_TO_DMS
		2	Message Specific Type	string<4>	TRSP=TREAT_SAMPLE_AND_PURGE_PORT
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Sample Identification	string<16>	Bar Code label, Note: Samples are only 12 chars
		6	Purge Port Identification	string<16>	Bar Code label
5.3.19	Treatment Container and Item Container Relationship	1	Message General Type	string<8>	PCSDMS = PCS_ DATA_TO_DMS
		2	Message Specific Type	string<4>	TCIC = TREAT_CONTAIN_AND_ITEM_CONTAIN
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Treatment Container ID	string<16>	Bar Code label
		6	Item Container ID	string<16>	Bar Code label, may be padded with NUL chars
5.3.20	Treatment Container and Loadout Drum Relationship	1	Message General Type	string<8>	PCSDMS = PCS_ DATA_TO_DMS
		2	Message Specific Type	string<4>	TCLD = TREAT_CONTAIN_AND_LOAD_DRUM
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Trtmnt Container ID	string<16>	Bar Code label
		6	Loadout Drum ID	string<16>	Bar Code label
5.3.21	TRU Packet Assay Monitor Results	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	PAMR=PACKET_ASSAY_MONITOR_RESULTS
		3	Date / Time	time_t<4>	XDR format
		4	Location	string<12>	See list of locations and acronyms
		5	Item Identification	string<16>	Bar Code label
		6	Pu 240 Equivalent Mass	double<8>	XDR - Assay results transmitted is in grams
		7	Uncertainty	double<8>	XDR - Uncertainty in percent
5.3.22	Request Status of DMS System	1	Message General Type	string<8>	PCSRDMS = REQUEST_DATA_FROM_DMS
		2	Message Specific Type	string<4>	RDMS = REQUEST_STATUS_DMS
5.3.23	Request Status of SIE System	1	Message General Type	string<8>	PCSRDMS = REQUEST_DATA_FROM_DMS
		2	Message Specific Type	string<4>	RSIE = REQUEST_STATUS_SIE

Table 8.3-1 NETCOM Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.3.24	Request Status of BWAS System	1	Message General Type	string<8>	PCSRDMS = REQUEST_DATA_FROM_DMS
		2	Message Specific Type	string<4>	RBWA = REQUEST_STATUS_BWAS
5.3.25	Status of PCS System	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	SPCS = STATUS_PCS
		3	Equip. Status Value	string<8>	corresponds to states, see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple status msgs
5.3.26	TRUPACT Assembly Complete	1	Message General Type	string<8>	PCSDMS = PCS_DATA_TO_DMS
		2	Message Specific Type	string<4>	TAC = TRUPACT_ASSEMBLY_COMPLETE
		3	TRUPACT ID	string<16>	Bar Code Label of entire 14-drum TRUPACT
5.3.27	Abort BWAS (used in during criticality alarms, manually reset)	1	Message General Type	string<8>	PCSRDMS = PCS_REQUEST_TO_DMS
		2	Message Specific Type	string<4>	ABWA = ABORT_BWAS

Table 8.3-2. NETCOM Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.4.1	Waste Container Location Update (Drum accepted, inner drum PIN, Transfer PIG location, or In Transit)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	CL = CONTAINER_LOCATION
		3	Container Location	string<12>	See list of locations and acronyms
		4	Number Containers	int<4>	XDR signed int (Count of containers following)
		5	Container Identifications	string<16>	Bar Code label, may be padded with NUL's
5.4.2	Fissile Inventory Level (**Note:** stop all container Movement and abort assay Processing)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	FML = FISSILE_MATERIAL_LEVEL
		3	Area Location	string<12>	TRU_GLVEBX, or TRURWGB
		4	Current Level (grams)	double<8>	XDR - Fissile Gram Equivalent
		5	Alarm Existing	string<4>	'T'=TRUE, 'F'=FALSE
5.4.3	Processing Pick List Item (priority is from the sequence of the Container List)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	PPLI = PROCESSING_PICK_LIST_ITEM
		3	Number Pick List Items	int<4>	XDR signed int (Count of pick list following)
		4	Container Identification(s)	string<16>	Bar Code label, may be padded with NUL's
		5	Process Route	string<4>	See list of routes and acronyms
		6	Sample ?	string<4>	T = TRUE, F = FALSE
		7	Compliant ?	string<4>	T = TRUE, F = FALSE
5.4.4	Transfer Car Pick List Item (priority is from the sequence of the Container List)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	TCPL = TRANSFER_CAR_PICK_LIST
		3	Number Pick List Items	int<4>	XDR signed int (Count of pick list following)
		4	Container Identification(s)	string<16>	Bar Code label, may be padded with NUL's
5.4.5	LLW Shipping Pick List Item (priority is from the sequence of the Container List)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	LSPL = LLW_SHIPPING_PICK_LIST
		3	Number Pick List Items	int<4>	XDR signed int (Count of pick list following)
		4	Container Identification(s)	string<16>	Bar Code label, may be padded with NUL's
5.4.6	TRU Shipping Pick List Item (priority is from the sequence of the Container List)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	TSPL = TRU_SHIPPING_PICK_LIST
		3	Number Pick List Items	int <4>	XDR signed int (Count of pick list following)
		4	Container Identification(s)	string<16>	Bar Code label, may be padded with NUL's
5.4.7	TRUPACT Assembly Pick List Item (priority is from the Sequence of the Container List)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	TAPL = TRUPACT_ASSEMBLY_PICK_LIST
		3	Number Pick List Items	int <4>	XDR signed int (Count of pick list following)
		4	Container Identification(s)	string<16>	Bar Code label, may be padded with NUL's

Table 8.3-2. NETCOM Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.4.8	BWAS Assay Started	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	BAS = BWAS_ASSAY_STARTED
5.4.9	BWAS Assay Aborted	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	BAA = BWAS_ASSAY_ABORTED
5.4.10	BWAS Assay Completed	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	BAC = BWAS_ASSAY_COMPLETED
5.4.11	Status of BWAS System	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	SBWA = STATUS_BWAS
		3	Equip. Status Value	string<8>	Corresponds to states (See Table 8.5-3)
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple status msgs
5.4.12	Status of DMS System	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	SDMS = STATUS_DMS
		3	Equip. Status Value	string<8>	see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple status msgs
5.4.13	Status of SIE System	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	SSIE = STATUS_SIE
		3	Status Value	string<8>	Correspond to states, see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple status msgs
5.4.14	Criticality Alert (**Note:** stop all container Movement and abort assay Processing)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	CRIT=CRITICALITY_ALERT
		3	Container Identification	string<16>	Bar Code label, may be padded with NUL's
		4	Alarm Level	double<8>	XDR - Pu Quantity in grams
		5	Criticality Location	string<12>	See tables of locations and acronyms
5.4.15	Empty Drum Process Route	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	EDPR = EMPTY_DRUM_PROCESS_ROUTE
		3	Container Identification	string<16>	Bar Code Label, padded with NUL's
		4	Process Route	string<4>	See list of routes and acronyms
5.4.16	Retrieve Empty Pallet	1	Message General Type	string<8>	DMSPCS
		2	Message Specific Type	String<4>	RTMT
		3	Location	String<4>	PSTD = Pallet Stand, XFCR = Transfer Car
		4	Pallet Identification	String<16>	PIN

Table 8.3-2. NETCOM Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.4.17	Facility Curie Level (**Note:** does NOT stop container Movement or abort assay Processing)	1	Message General Type	string<8>	DMSPCS = DMS_DATA_TO_PCS
		2	Message Specific Type	string<4>	FCL = FACILITY_CURIE_LEVEL
		3	Dosage Equiv. (curies)	double<8>	XDR - Dosage in Curies (0-1000)
		4	Alarm Existing	string<4>	'T'=TRUE, 'F'=FALSE
5.4.18	DMS Alarm to the PCS	1	Message General Type	string<8>	DMSPCS
		2	Message General Type	String<4>	ALRM
		3	Equip. Status Value	String<8>	See Table 8-5
		4	Software Error Code	Int<4>	XDR Signed Integer
		5	Status Message	String<64>	Note: Multiple errors sent as multiple status msgs
5.4.19	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	

DMS <--> PCS INTERFACE NOTES:

Facility Curie Level (FCL) and Fissile Inventory Level (FIL) are sent from the DMS to the PCS unprompted whenever the DMS recalculates these levels.
When a drum is at a glovebox entry port, the PCS will send a container location update message, the DMS will replay with a container location update message, if the drum PIN is different from that just sent by the PCS, then the drum is an Overpack and the PIN from the DMS is the inner drum PIN.
The PCS system is responsible for monitoring Puck Weight additions to an overpack drum and preventing pucks from being added that exceed a pre-defined setpoint total overpack drum weight.
If a drum bypasses the compactor, the PCS will still send LLW_CMPCT and LLW_PUCK location update messages to the DMS. At the LLW_PUCK position, the CLW message will contain the actual weight of the drum (not a puck).
The PCS will monitor the number of POPD (Puck and Overpack Drum Relationship) messages sent to the DMS. If only 1 has been sent then the waste form is assumed to be NOT compacted and the process route will be 101. If multiple POPD's are sent, then the process route will be 102 (skipping NDE analysis).

Table 8.3-3. NETCOM Message Formats: Plant Control System (PCS) to Automated Guided Vehicle (AGV) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.5.1	Request Status of AGV System	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	RAGV = REQUEST_STATUS_AGV
5.5.2	Request Location of an AGV	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	RAL = REQUEST_ AGV_LOCATION
		3	AGV To get Location of	string<4>	'1'=NDE/NDA AGV, '2'=Process AGV
5.5.3	AGV Transport Command (**Note:** "UNKNOWN" as pickup or dropoff location means that this Command is just a dropoff or Pickup command – not a Combined command)	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	DTC = DRUM_TRANSPORT_COMMAND
		3	AGV To Command	string<4>	'1'=NDE/NDA AGV, '2'=Process AGV
		4	Drum PIN	string<16>	Bar code label, may be padded with NUL's
		5	Pickup Location	string<12>	See table of locations and acronyms
		6	Pickup Request or Command	string<4>	'R'=Request, 'C'=Command
		7	Dropoff Location	string<12>	See table of locations and acronyms
		8	Dropoff Request or Command	string<4>	'R'=Request, 'C'=Command
5.5.4	S/R/NDE/NDA Door Is Opened	1	Message General Type	string<8>	PCSAGV = PCS_DATA_TO_AGV
		2	Message Specific Type	string<4>	NDO = NDA_DOOR_IS_OPEN
5.5.5	Request Transport Queue of AGV System	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	RQUE = REQUEST_QUEUE_AGV
		3	AGV to get Queue of	string<4>	'1'=NDE/NDA, '2'=Process
5.5.6	Disable all AGV Movement (This occurs when the PCS gets a Fissile Material or Criticality alarm)	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	DAGV = DISABLE_AGV_MOVEMENT
		3	AGV to Disable	string<4>	'1'=NDE/NDA, '2'=Process
5.5.7	Enable all AGV Movement (Sent Manually rom operators after mat. Alarm is cleared)	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	EAGV = ENABLE_AGV_MOVEMENT
		3	AGV to Enable	string<4>	'1'=NDE/NDA, '2'=Process
5.5.8	Status of PCS System	1	Message General Type	string<8>	PCSAGV = PCS_DATA_TO_AGV
		2	Message Specific Type	string<4>	SPCS = STATUS_PCS
		3	Equip. Status Value	string<8>	Corresponds to states, see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple status msgs

Table 8.3-3. NETCOM Message Formats: Plant Control System (PCS) to Automated Guided Vehicle (AGV) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.5.9	Release AGV from P & D Location	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	RAPD = RELEASE_AGV_PD_LOCATION
		3	AGV to Release	string<4>	'1'=NDE/NDA, '2'=Process
5.5.10	Advance AGV (at Glovebox HOLD_POINT Location)	1	Message General Type	string<8>	PCSRAGV = PCS_REQUEST_ TO_AGV
		2	Message Specific Type	string<4>	AAGV = ADVANCE_AGV_AT_HOLD_POINT
		3	AGV to Advance	string<4>	Only valid for '2'=Process
5.5.11	Airlock Conveyor Status (HOLD_POINT Location) CV-09-103A, CV-09-201A CV-09-103B, CV-09-201B	1	Message General Type	string<8>	PCSAGV = PCS_DATA_ TO_AGV
		2	Message Specific Type	string<4>	ACS = AIRLOCK_CONVEYOR_STATUS
		3	Airlock Conveyr 'A' Status	string<4>	'R', 'F', 'X' ('F'orward to Process, 'R'everse from Process, 'X'=Disabled or in maintenance)
			Airlock Conveyr 'B' Status	string<4>	'R', 'F', 'X' ('F'orward to Process, 'R'everse from Process, 'X'=Disabled or in maintenance)

AGV CONTROL NOTES:

If both the pickup and dropoff location is a battery charger location, the AGV should travel there without any drums. If drums are mounted on the AGV and cannot be Dropped Off (even at the Buffer Storage Carousel), an error condition exists. When the AGV is at a Battery Charging station, the dropoff location transmitted is the station acronym and 'Which Location Field' = 'D'. The AGV Control System is responsible for tracking and mating drums to the two roller decks on an AGV. When the AGVCS is to match where a drum is to be dropped off or where the drum is to be picked up, UNKNOWN will be entered in the field for the missing information that the AGVCS will supply. As described in the "PCS-AGVCS Control interface document", the AGVCS is responsible for polling the PCS through a Transport Command Request to determine if drums can be sent to a buffer storage carousel for timed out drum PickUps. A Container Location Update message is sent to the DMS when the AGV shows up at a Drum NDE, PAN, or GEA Transfer conveyor. This allows the DMS to prepare the drum database for downloading to the SIE system. Before the AGV is allowed to leave a P & D location, the AGVCS must see the associated IRCOM light extinguish AND receive a "Release AGV" message. This provides for failsafe drum transfers preventing the AGV leaving the P & D location in the middle of a drum transfer due to a IRCOM light failure. The AGV issues an unprompted AGV_LOCATION network message upon arriving at any Pickup and/or Dropoff station with the appropriate location entered in the Pickup and Dropoff fields, along with the "Which Location" field. This allows the PCS to know the direction to run the conveyors (fwd / rev) for transfers occurring at the buffer storage carousels where the AGV may need to drop off a drum at the same time it picks up a drum. It also helps confirm data before initiating drum movement. The AGVCS also sends a new Location (AGVL) message to the PCS as soon as a drum is picked up (or dropped off) at all P & D locations. This ensures that the PCS knows that the drum was successfully picked up (or dropped off) from the new drum found on a roller deck within the Location message. The AGVCS sends a AGVL message whenever it changes drum-carrying state. Thus, it will send an AGVL message when it shows up at a P & D location and sends the message again (with slightly different data) after the successful pickup or drop off. The "Release AGV" message is also used to release the AGV from the Process Area "HOLD_POINT". The AGV must always stop at Roller Deck #1 when at the hold point and Advance to Roller Deck #2. Also, when at the "HOLD_POINT", the AGV issues an AGVL location message to the PCS with the "Which Location Field" = 'T' and Dropoff Location = HOLD_POINT.

Table 8.3-4. NETCOM Message Formats: Automated Guided Vehicle (AGV) to Plant Control System (PCS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.6.1	Status of AGV System	1	Message General Type	string<8>	AGVPCS = AGV_DATA_TO_PCS
		2	Message Specific Type	string<4>	SAGV = STATUS_AGV
		3	Status Value	string<8>	Correspond to states see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple status mesgs.
5.6.2	Location of AGV System (This message is transmitted Whenever the AGV changes drum Carrying state in addition to when Arriving at a P&D location or in Response to a location request) Roller Deck #1 is closest to the Control cabinet (large vertical Box) on the AGV.	1	Message General Type	string<8>	AGVPCS = AGV_DATA_TO_PCS
		2	Message Specific Type	string<4>	AGVL = AGV_LOCATION
		3	AGV Reporting Location	string<4>	'1'=NDE/NDA AGV, '2'=Process AGV
		4	Pickup Location	string<12>	See table of locations and acronyms
		5	Dropoff Location	string<12>	See table of locations and acronyms
		6	Roller Deck Using	string<4>	'0', '1', or '2' (Deck PU / DO refers to)
		7	Which location is AGV at	string<4>	'P'=at Pickup, 'D'=at Dropoff, 'T'=in Transit
		8	# of Drums on AGV	string<4>	'0', '1', or '2'
		9	Roller Deck #1 Drum PIN	string<16>	Bar Code Label, may be padded with NUL's
		10	Roller Deck #2 Drum PIN	string<16>	Bar Code Label, may be padded with NUL's
5.6.3	Request to Open S/R/NDE/NDA Door	1	Message General Type	string<8>	AVGRPCS = AGV_REQUEST _TO_PCS
		2	Message Specific Type	string<4>	ROD = REQUESR_OPEN_NDA_DOOR
5.6.4	Ok to Close S/R/NDE/NDA Door	1	Message General Type	string<8>	AVGPCS = AGV_DATA_TO_PCS
		2	Message Specific Type	string<4>	OCD = OK_TO_CLOSE_NDA_DOOR
5.6.5	Transport Request Received Confirmation	1	Message General Type	string<8>	AGVPCS = AGV_DATA_TO_PCS
		2	Message Specific Type	string<4>	TRCV = TRANSPORT_REQUEST_RECEIVED
		3	AGV Transporting	string<4>	'1'=NDE/NDA AGV, '2'=Process AGV
		4	Roller deck drum is on	string<4>	'1' or '2'
		5	Length of Queue	int<4>	XDR int, requests waiting to occur

Table 8.3-4. NETCOM Message Formats: Automated Guided Vehicle (AGV) to Plant Control System (PCS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.6.6	Transport Queue List in AGV (Pickup or Dropoff may be UNKNOWN for S/R/NDE/NDA Area)	1	Message General Type	string<8>	AGVPCS = AGV_DATA_TO_PCS
		2	Message Specific Type	string<4>	QUEI = QUEUE_ITEM_AGV
		3	AGV Reporting Queue	string<4>	'1'=NDE/NDA AGV, '2'=Process AGV
		4	Queue Length	int<4>	XDR int (fields #5, #6, #7 repeated this many times)
		5	Pickup Location	string<10>	See table of locations and acronyms
		6	Dropoff Location	string<10>	See table of locations and acronyms
		7	Drum PIN	string<16>	Bar code label, may be padded with NUL's
5.6.7	AGV Transport Command (**Note:** "UNKNOWN" as pickup or dropoff location means that this Command is just a dropoff or Pickup command – not a Combined command)	1	Message General Type	string<8>	AGVRPCS = AGV_REQUEST_TO_PCS
		2	Message Specific Type	string<4>	DTC = DRUM_TRANSPORT_COMMAND
		3	AGV Command From	string<4>	'1'=NDE/NDA AGV, '2'=Process AGV
		4	Drum PIN	string<16>	Bar code label, may be padded with NUL's
		5	Pickup Location	string<12>	See table of locations and acronyms
		6	Pickup Request or Command	string<4>	'R'=Request, 'C'=Command
		7	Dropoff Location	string<12>	See table of locations and acronyms
		8	Dropoff Request or Command	string<4>	'R'=Request, 'C'=Command

Table 8.3-5. NETCOM Message Formats: Plant Control System (PCS) to Automatic Stacking / Retrieving Systems (AS/RS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.7.1	Request Status of ASRS System	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	RASR = REQUEST_STATUS_ASRS
5.7.2	Display Message Text at AS/RS Pallet Stand Local Display	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	DMPS = DISPLAY_MESSAGE_PALLET_STAND
		3	Message Text	string<32>	Actual message to display (if > 20 chars, scrolled)
5.7.3	Display Message Text at AS/RS Transfer Car Local Display	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	DMTC = DISPLAY_MESSAGE_TRANSFER_CAR
		3	Message Text	string<32>	Actual message to display (if > 20 chars, scrolled)
5.7.4	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.7.5	ID of Drums to store at Pallet Stand (Variable length message, Valid values for Number field are 1 - 4)	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	SDPS = STORE_DRUM_AT_PALLET_STAND
		3	Number of Drum ID's	int<4>	XDR, Number Drum ID's following to store at Pallet
		4	Drum Identification	string<16>	bar code label
5.7.6	ID of Drum to Retrieve to Pallet Stand (Up to 4 drums retrieved - PCS also sends display message 5.7.2 "TRANSFER TO PROCESS")	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	RDPS = RETRIEVE_DRUM_TO_PALLET_STAND
		3	Drum Identification	string<16>	bar code label
5.7.7	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.7.8	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.7.9	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.7.10	ID of Drum to Retrieve to Transfer Car (Up to 4 drums Retrieved – PCS also sends message 5.7.3 to ASRS TC display "TRANSFER TO PROCESS")	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	RDTC = RETRIEVE_DRUM_TO_TRANSFER_CAR
		3	Drum Identification	string<16>	bar code label
5.7.11	ID of Drum to store at Transfer Car	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	SDTC = STORE_DRUM_AT_TRANSFER_CAR
	(Variable Length Message)	3	Number of Drum ID's	int<4>	Number Drum ID's following to store at Pallet
		4	Drum Identification	string<16>	bar code label

Table 8.3-5. NETCOM Message Formats: Plant Control System (PCS) to Automatic Stacking / Retrieving Systems (AS/RS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.7.12	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.7.13	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.7.14	Spare	1	Message General Type	string<8>	
		2	Message Specific Type	string<4>	
5.7.15	Status of PCS System	1	Message General Type	string<8>	PCSASRS = PCS_DATA_TO_ASRS
		2	Message Specific Type	string<4>	SPCS = STATUS_PCS
		3	Equip. Status Value	string<8>	Corresponds to states, see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Equip. Status Message	string<64>	Note: Multiple errors sent as multiple status msgs
5.7.16	Request AS/RS Drum Database (used for PCS database restoration)	1	Message General Type	string<8>	PCSASRS = PCS_REQUEST_TO_ASRS
		2	Message Specific Type	string<4>	RADB = REQUEST_ASRS_DRUM_DATABASE
5.7.17	Disable all ASRS Drum Movement (When PCS gets Fissile Material alarm)	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_ TO_ASRS
		2	Message Specific Type	string<4>	DASR = DISABLE_ASRS_MOVEMENT
5.7.18	Enable all ASRS Drum Movement (Sent manually after material alarm cleared)	1	Message General Type	string<8>	PCSRASRS = PCS_REQUEST_ TO_ASRS
		2	Message Specific Type	string<4>	EASR = ENABLE_ASRS_MOVEMENT

NOTES:

When operator scans a "STR DRMPS" code and all bar code data is selected properly, the PCS transmits Store Drum at Pallet Stand with identifications (SDPS). This message contains a Drum ID field which is repeated within the message a number of times (value of field #3). Following a stored pallet confirmation, the PCS will transmit a Container Location Update message to the DMS with 1-4 bar coded Container ID's with the ASRS as a location. Additionally, if possible, the bin location within the Pallet Stand will be transmitted to the DMS in the Pallet Bin Location Field of the Container Location Update (CL) command.

The PCS system has complete control over the AS/RS "marquee" message displays found near the Transfer Car and Pallet Stand. Through message 5.7.2 and 5.7.3, the PCS can send any text it wishes to these message displays. The AS/RS control system does not ever send a message to these displays. Alarm situations will be sent to the PCS via an AS/RS Status message (5.8.1). The error message text field will also be echoed back to the AS/RS message displays via the PCS messages 5.7.2 and 5.7.3. Any error message text field greater than 32 characters will be truncated for display on the AS/RS marquees. Any messages longer than 20 characters causes the marquee displays to "scroll".
PLT STND DRMS REQ ID, <4 PS DRM ID ENT (#), >4 PS DRM ID ENT (#), XFR CAR DRM IDs REQD, <4 TC DRM ID ENT (#), >4 TC DRM ID ENT (#), LLW TO OFFSITE STORE, TRU TO TEMP STORAGE, TRU TO TRUPACT ASSY, TRANSFER TO PROCESS, AS/RS READY, AS/RS NOT READY, AS/RS TROUBLE, NO AS/RS LOCN AVAIL, PALLET TO DISCH CVYR, CAN'T FIND/RET DRUMS, XFER CAR NOT AVAIL messages are displayed using messages 5.7.2 and 5.7.3 with the message text field supplied by the PCS system.

Table 8.3-6. NETCOM Message Formats: Automatic Stacking / Retrieving Systems (AS/RS) to Plant Control System (PCS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.8.1	Status of ASRS System	1	Message General Type	string<8>	ASRSPCS = ASRS_DATA_TO_PCS
		2	Message Specific Type	string<4>	SASR = STATUS_ASRS
		3	Status Value	string<8>	Correspond to states, see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple messages
5.8.2	ASRS Stored Pallet from Pallet Stand Confirmation	1	Message General Type	string<8>	ASRSPCS = ASRS_DATA_TO_PCS
		2	Message Specific Type	string<4>	ASPP = ASRS_STORED_PALLET_FROM_PS
		3	Pallet Storage Location	string<4>	Format described at end of this table
		4	Number Drums on Pallet	int<4>	XDR signed int (# of Containers following, 0-4)
		5	Drum Identifications	string<16>	Bar Code label, may be padded with NUL's This field is repeated NumberDrum times.
5.8.3	ASRS Retrieved Pallet to Pallet Stand Confirmation	1	Message General Type	string<8>	ASRSPCS = ASRS_DATA_TO_PCS
		2	Message Specific Type	string<4>	ARPP = ASRS_RETRIEVED_PALLET_TO_PS
		3	Pallet Storage Location	string<4>	Format described at end of this table
		4	Number Drums on Pallet	int<4>	XDR signed int (# of Containers following, 0-4)
		5	Drum Identifications	string<16>	Bar Code label, may be padded with NUL's This field is repeated NumberDrum times.
5.8.4	ASRS Stored Pallet from Transfer Car Confirmation	1	Message General Type	string<8>	ASRSPCS = ASRS_DATA_TO_PCS
		2	Message Specific Type	string<4>	ASPT = ASRS_STORED_PALLET_FROM_TC
		3	Pallet Storage Location	string<4>	Format described at end of this table
		4	Number Drums on Pallet	int<4>	XDR signed int (# of Containers following, 0-4)
		5	Drum Identifications	string<16>	Bar Code label, may be padded with NUL's This field is repeated NumberDrum times.
5.8.5	ASRS Retrieved Pallet to Transfer Car Confirmation	1	Message General Type	string<8>	ASRSPCS = ASRS_DATA_TO_PCS
		2	Message Specific Type	string<4>	ARPT = ASRS_RETRIEVED_PALLET_TO_TC
		3	Pallet Storage Location	string<4>	Format described at end of this table
		4	Number Drums on Pallet	int<4>	XDR signed int (# of Containers following, 0-4)
		5	Drum Identifications	string<16>	Bar Code label, may be padded with NUL's This field is repeated NumberDrum times.

Table 8.3-6. NETCOM Message Formats: Automatic Stacking / Retrieving Systems (AS/RS) to Plant Control System (PCS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.8.6	ASRS Drum Database	1	Message General Type	string<8>	ASRSPCS = ASRS_DATA_TO_PCS
	(This message can be up to	2	Message Specific Type	string<4>	ADDB = ASRS_DRUM_DATABASE
	8+4+4+(54*(8+(4*16))) or 3904	3	Number of Pallets	int<4>	XDR int, number of pallet groups following
	Bytes long)	4	Pallet Storage Location	string<4>	Format described at end of this table
		5	# of Drums on Pallet	int<4>	0 - 4 are valid, drum ID below repeated this #
		6	Drum Identification	string<16>	bar code label

NOTES:

AS / RS Ready / Idle, Storage Full Alarm (0 left), can't find Drum (trouble completing task), Pallet Stand and/or Transfer Car Unavailable (trouble completing task) status values received from general status message. Message differentiation obtained from enumerated Filed #4 (Error Code) provided by AS/RS vendor.
Format of Pallet Storage Location is as follows: [Row][Column][Rack]

Where: Row is a one digit ASCII numeral between '1' and '3' where '1' is the lowest tier and '3' the highest Column is a one digit ASCII numeral between '1' and '9' where '1' is the bin closest to the transfer car / pallet stand. '1' is also on the West end and '9' is on the East end of each Rack. Rack is a one-character ASCII representation of which rack to use, valid values are 'N' and 'S'. The last character of this four character "string" is always ASCII 0 (NUL).

Example: '19N' represents the bottom tier (row), the last column (farthest from the transfer car / pallet stand), in the North rack.

Table 8.3-7. NETCOM Message Formats: Plant Control System (PCS) to Packet Assay Monitor (PAM) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.9.1	Request Status of PAM System	1	Message General Type	string<8>	PCSRPAM = PCS_REQUEST_TO_PAM
		2	Message Specific Type	string<4>	RPAM = REQUEST_STATUS_PAM
5.9.2	Enable (Start) Packet Assay Monitor System	1	Message General Type	string<8>	PCSRPAM = PCS_REQUEST_TO_PAM
		2	Message Specific Type	string<4>	EPAM = ENABLE_PAM
		3	Matrix Type Calibration	string<16>	format TBD, menu selection from an OIU
5.9.3	Send Packet Assay Results	1	Message General Type	string<8>	PCSRPAM = PCS_REQUEST_TO_PAM
		2	Message Specific Type	string<4>	SPAR = SEND_PACKET_ASSAY_RESULTS
5.9.4	Reset Packet Assay Monitor (Stopping any assay in progress, this may be called upon Fissile or Critical Material alarm conditions)	1	Message General Type	string<8>	PCSRPAM = PCS_REQUEST_TO_PAM
		2	Message Specific Type	string<4>	RSTP =RESET_PAM
5.9.5	Status of PCS System	1	Message General Type	string<8>	PCSPAM = PCS_DATA_TO_PAM
		2	Message Specific Type	string<4>	SPCS = STATUS_PCS
		3	Equip. Status Value	string<8>	corresponds to states, see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple status msgs

Table 8.3-8. NETCOM Message Formats: Packet Assay Monitor (PAM) to Plant Control System (PCS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.10.1	Status of PAM System	1	Message General Type	string<8>	PAMPCS = PAM_DATA_TO_PCS
		2	Message Specific Type	string<4>	SPAM = STATUS_PAM
		3	Status Value	string<8>	Correspond to states, see Table 8-5
		4	Software Error Code	int<4>	XDR Signed Integer
		5	Status Message	string<64>	Note: Multiple errors sent as multiple statues
5.10.2	Packet Assay Monitor Results	1	Message General Type	string<8>	PAMPCS = PAM_DATA_TO_PCS
		2	Message Specific Type	string<4>	PAMR=PACKET_ASSAY_MONITOR_RESULTS
		3	Pu 240 Effective Mass	double<8>	XDR - Assay results transmitted is in grams
		4	Uncertainty	double<8>	XDR - Uncertainty in absolute +/- grams (1 standard deviation

NOTE:

Packet Assay Monitoring system status (in progress, finished, etc.) from general status request command.

Table 8.3-9. NETCOM Message Formats: Plant Control System (PCS) to Passive Active Neutron System (PAN) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.11.1	Request Status of PAN System	1	Message General Type	string<8>	PCSRPAN = REQUEST_DATA_FROM_PAN
		2	Message Specific Type	string<4>	RPAN = REQUEST_STATUS_PAN
		3	PAN Station Letter	string<4>	PAN system (currently only A and B valid)
5.11.2	Abort PAN Assay	1	Message General Type	string<8>	PCSRPAN= PCS_REQUEST_TO_PAN
		2	Message Specific Type	string<4>	APAN=ABORT_PAN_ASSAY
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.11.3	Request to Drop off Drum	1	Message General Type	string<8>	PCSRPAN= PCS_REQUEST_TO_PAN
		2	Message Specific Type	string<4>	RDOD=REQUEST_TO_DROP_OFF_DRUM
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.11.4	Ready to Pickup Drum, Start Conveyor	1	Message General Type	string<8>	PCSRPAN= PCS_REQUEST_TO_PAN
		2	Message Specific Type	string<4>	RPUD=REQUEST_TO_PICKUP_DRUM
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.11.5	Stop Drum Transfer Conveyor (due to drum out)	1	Message General Type	string<8>	PCSRPAN= PCS_REQUEST_TO_PAN
		2	Message Specific Type	string<4>	ORSC=OUT_REQUEST_STOP_CONVEYOR
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.11.6	Ready to Observe Strike Shape, Initiate Neutron Pulse (sent by Operator Control Station)	1	Message General Type	string<8>	PCSRPAN= PCS_REQUEST_TO_PAN
		2	Message Specific Type	string<4>	INP=INITIATE_NEUTRON_PULSE
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.11.7	Neutron Pulse Strike Shape GOOD (sent by Operator Control Station)	1	Message General Type	string<8>	PCSPAN= PCS_DATA_TO_PAN
		2	Message Specific Type	string<4>	NPG=NEUTRON_PULSE_GOOD
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.11.8	Neutron Pulse Strike Shape BAD (sent by Operator Control Station)	1	Message General Type	string<8>	PCSPAN= PCS_DATA_TO_PAN
		2	Message Specific Type	string<4>	NPB=NEUTRON_PULSE_BAD
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.11.9	Stop Drum Transfer Conveyor (due to transfer trouble)	1	Message General Type	string<8>	PCSRPAN= PCS_REQUEST_TO_PAN
		2	Message Specific Type	string<4>	FRSC=FAIL_REQUEST_STOP_CONVEYOR
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')

Table 8.3-10. NETCOM Message Formats: Passive Active Neutron System (PAN) to Plant Control System (PCS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.12.1	Status of PAN System	1	Message General Type	string<8>	PANPCS = PAN_DATA_TO_PCS
		2	Message Specific Type	string<4>	SPAN = STATUS_PAN
		3	PAN System Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
		4	Status Value	string<8>	See Table 8-5
		5	Software Error Code	int<4>	XDR Signed Integer
		6	Status Message	string<64>	Note: Multiple errors sent as multiple Statuses
5.12.2	Ready to Accept Drum Transfer, Conveyor Started	1	Message General Type	string<8>	PANPCS= PAN_DATA_TO_PCS
		2	Message Specific Type	string<4>	RAD = READY_TO_ACCEPT_DRUM
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.12.3	Drum Presence Sensed in Station Conveyor Stopped	1	Message General Type	string<8>	PANPCS= PAN_DATA_TO_PCS
		2	Message Specific Type	string<4>	DPS = DRUM_PRESENCE_SENSED
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')
5.12.4	Request Neutron Pulse for Strike Shape Validation	1	Message General Type	string<8>	PANRPCS= PAN_REQUEST_TO_PCS
		2	Message Specific Type	string<4>	RNP = REQUEST_NEUTRON_PULSE
		3	PAN Station Letter	string<4>	Which PAN subsystem (currently 'A' or 'B')

NOTES:

The PAN "A" unit is on the east side and PAN "B" is on the west side of the facility.
PAN assay in progress, PAN Instrument fault and aborting or continuing, PAN system ready, and PAN assay complete messages are from the status message.

Table 8.3-11. NETCOM Message Formats: Plant Control System (PCS) to Gamma Energy Assay System (GEA) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.13.1	Request Status of GEA System	1	Message General Type	string<8>	PCSRGEA = REQUEST_DATA_FROM_GEA
		2	Message Specific Type	string<4>	RGEA = REQUEST_STATUS_GEA
		3	GEA System Letter	string<4>	GEA system (currently only A and B valid)
5.13.2	Abort GEA Assay	1	Message General Type	string<8>	PCSRGEA= PCS_REQUEST_TO_GEA
		2	Message Specific Type	string<4>	AGEA=ABORT_GEA_ASSAY
		3	GEA Station Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')
5.13.3	Request to Drop off Drum	1	Message General Type	string<8>	PCSRGEA = PCS_REQUEST_TO_GEA
		2	Message Specific Type	string<4>	RDOD=REQUEST_TO_DROP_OFF_DRUM
		3	GEA Station Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')
5.13.4	Ready to Pickup Drum, Start Conveyor	1	Message General Type	string<8>	PCSRGEA = PCS_REQUEST_TO_GEA
		2	Message Specific Type	string<4>	RPUD=REQUEST_TO_PICKUP_DRUM
		3	GEA Station Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')
5.13.5	Stop Drum Transfer Conveyor (due to drum out)	1	Message General Type	string<8>	PCSRGEA = PCS_REQUEST_TO_GEA
		2	Message Specific Type	string<4>	ORSC=OUT_REQUEST_STOP_CONVEYOR
		3	GEA Station Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')
5.13.6	Stop Drum Transfer Conveyor (due to transfer trouble)	1	Message General Type	string<8>	PCSRGEA = PCS_REQUEST_TO_GEA
		2	Message Specific Type	string<4>	FRSC=FAIL_REQUEST_STOP_CONVEYOR
		3	GEA Station Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')

NOTE:

The GEA "A" unit is on the east side and GEA "B" is on the west side of the facility.

Table 8.3-12. NETCOM Message Formats: Gamma Energy Assay System (GEA) to Plant Control System (PCS) Messages

Msg #	Message Description	Field #	Data Description	Type	Allowed Values / Comments
5.14.1	Status of GEA System	1	Message General Type	string<8>	GEAPCS = GEA_DATA_TO_PCS
		2	Message Specific Type	string<4>	SGEA = STATUS_GEA
		3	GEA System Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')
		4	Status Value	string<8>	See Table 8-5
		5	Software Error Code	int<4>	XDR Signed Integer
		6	Status Message	string<64>	Note: Multiple errors sent as multiple statues
5.14.2	Ready to Accept Drum Transfer, Conveyor Started	1	Message General Type	string<8>	GEAPCS= GEA_DATA_TO_PCS
		2	Message Specific Type	string<4>	RAD = READY_TO_ACCEPT_DRUM
		3	GEA Station Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')
5.14.3	Drum Presence Sensed in Station Conveyor Stopped	1	Message General Type	string<8>	GEAPCS= GEA_DATA_TO_PCS
		2	Message Specific Type	string<4>	DPS = DRUM_PRESENCE_SENSED
		3	GEA Station Letter	string<4>	Which GEA subsystem (currently 'A' or 'B')

8.4 PLC MESSAGE FORMATS

Table 8.4-1. PLC Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.3.1	Waste Container Location Update		Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 16-408
		4	Container(s) Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Pallet Bin Location	ASCII	2	Valid only when Containers stored at AS/RS. Format described at end of section 5.8, NetCom
		7	Number Containers	Int		1-50
		8	Container Identifications	ASCII	8-400	Bar Code label. This field is repeated Number Container times.
5.3.2	Waste Container Location with Container Weight		Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 16
		4	Container(s) Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Number Containers	Int		
		6	Container Identifications	ASCII	8	Bar Code label
		14	Drum Weight	Int		Weight transmitted is in Kilograms. Errors in weight transmitter are sent as 0 - Repeated Field Format: 1st word, mantissa, 2nd word, decimal
5.3.3	Spare					
5.3.4	Overpack Drum Contamination Status		Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 14

Table 8.4-1. PLC Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
		4	Drum Location	Int		LLW_ENTRY or TRU_ENTRY
		5	Drum Identification	ASCII	8	Bar Code label
		13	Contamination Status	Int		TRUE ('1') or FALSE ('0')
5.3.5	Restricted Waste Packet and Transfer Drum Relationship (Sent AFTER msg 5.3.6)		Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	RW Packet Identification	ASCII	8	Bar Code label
		13	RW Transfer Drum ID	ASCII	8	Bar Code label
5.3.6	Restricted Waste Packet and Parent Drum Relationship (Sent BEFORE msg 5.3.5)		Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		6
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	RW Packet Identification	ASCII	8	Bar Code label
		13	RW Transfer Drum ID	ASCII	8	Bar Code label
5.3.7	Purge Port Location Update		Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		7
		3	Message Length	Int		Number of words in the message, 13
		4	Purge Port Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Purge Port Identification	ASCII	8	Bar Code label
5.3.8	Sample and Parent Drum / Packet Relationship		Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		8
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD

Table 8.4-1. PLC Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
		5	Sample Identification	ASCII	8	Bar Code label, Note: only 12 used for samples
		13	Parent Drum / Packet ID	ASCII	8	Bar Code label
5.3.9	Sample and Purge Port Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		9
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Sample Identification	ASCII	8	Bar Code label, Note: only 12 used for samples
		13	Purge Port ID	ASCII	8	Bar Code label
5.3.10	Purge Port and Transfer PIG Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		10
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Purge Port Identification	ASCII	8	Bar Code label
		13	Transfer PIG ID	ASCII	8	Bar Code label
5.3.11	Spare					
5.3.12	Puck and Overpack Drum Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		12
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Puck Identification	ASCII	8	Bar Code label, Note: Puck ID's are 6 chars
		13	Overpack Drum ID	ASCII	8	Bar Code label
5.3.13	Remove Items from Transfer Stand	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		13
		3	Message Length	Int		Number of words in the message, 21

Table 8.4-1. PLC Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	RWM Xfer Drum ID	ASCII	8	Bar Code label
		13	Item Identification	ASCII	8	Bar Code label
5.3.14	Add Items to Transfer Stand	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		14
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	RWM Xfer Drum ID	ASCII	8	Bar Code label
		13	Item Identification	ASCII	8	Bar Code label
5.3.15	Non-Compliant Item and Packet Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		15
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Item Identification	ASCII	8	Bar Code label
		13	Packet Identification	ASCII	8	Bar Code label
5.3.16	Aerosol Can to Collection Container Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		16
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Aerosol Can ID	ASCII	8	Bar Code label
		13	Collection Container ID	ASCII	8	Bar Code label
5.3.17	Non-Compliant Items Presented for Treatment, request DMS display Instructions	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		17
		3	Message Length	Int		Number of words in the message, 12

Table 8.4-1. PLC Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Item Identification	ASCII	8	Bar Code label
5.3.18	Samples Presented for Treatment and Purge Port Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		18
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Sample Identification	ASCII	8	Bar Code label, Note: Samples are only 12 chars
		13	Purge Port Identification	ASCII	8	Bar Code label
5.3.19	Treatment Container and Item Container Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		19
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Treatment Container ID	ASCII	8	Bar Code label
		13	Item Container ID	ASCII	8	Bar Code label, may be padded with NUL chars
5.3.20	Treatment Container and Loadout Drum Relationship	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		20
		3	Message Length	Int		Number of words in the message, 21
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Trtmnt Container ID	ASCII	8	Bar Code label
		13	Loadout Drum ID	ASCII	8	Bar Code label

Table 8.4-1. PLC Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.3.21	TRU Packet Assay Monitor Results	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		21
		3	Message Length	Int		Number of words in the message, 17
		4	Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Item Identification	ASCII	8	Bar Code label
		13	Pu 240 Equivalent Mass	Int		Assay results transmitted is in grams. Format: 1st word, mantissa, 2nd word, decimal
		15	Uncertainty	Int		Uncertainty in percent. Format: 1st word, mantissa, 2nd word, decimal
5.3.22	Request Status of DMS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		22
		3	Message Length	Int		Number of words in the message, 4
5.3.23	Request Status of SIE System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		23
		3	Message Length	Int		Number of words in the message, 4
5.3.24	Request Status of BWAS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		24
		3	Message Length	Int		Number of words in the message, 4
5.3.25	Status of PCS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		25
		3	Message Length	Int		Number of words in the message, 39
		4	Equip. Status Value	BCD		Corresponds to states, see NetCom table 8-5
		6	Software Error Code	Int		
		7	Status Message	ASCII		Note: Multiple errors sent as multiple status msgs

Table 8.4-1. PLC Message Formats: Messages sent from Plant Control System (PCS) to Data Management System (DMS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.3.26	TRUPACT Assembly Complete	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		26
		3	Message Length	Int		Number of words in the message, 12
		4	TRUPACT ID	ASCII	8	Bar Code Label of entire 14-drum TRUPACT
5.3.27	Abort BWAS (used during criticality alarms, manually reset)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		3
		2	Specific Message Number	Int		27
		3	Message Length	Int		Number of words in the message, 4

Table 8.4-2. PLC Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.4.1	Waste Container Location Update (Drum accepted, inner drum PIN, transfer PIG location, or In Transit)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 14-406
		4	Container Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Number Containers	Int		Count of containers following, 1-50
		6	Container Identifications	ASCII	8-400	Bar Code label, may be padded with NUL's
5.4.2	Fissile Inventory Level (Note: stop all container movement and abort assay processing)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 8
		4	Area Location	Int		TRU_GLVEBX or TRURWGB
		5	Current Level (grams)	Int		Fissile Gram Equivalent. Format: 1st word, mantissa, 2nd word, decimal
		7	Alarm Existing	Int		'1'=TRUE, '0'=FALSE
5.4.3	Processing Pick List Item (priority is from the sequence of the the Container List) (Note: Message to be divided into two PLC data files and sent as two separate messages: 50 drums into 1st file--800 words 50 drums into 2nd file--800 words)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 22-814
		4	# Pick List Items	Int		Count of pick list following, 1-100 (next 4 fields repeated this many times)
		5	Message Number	Int	1	"1" = message for 1st 50 drums, "2" = message for 2nd 50 drums
		6	Container Identification(s)	ASCII	8	Bar Code label, may be padded with NUL's
		14	Process Route	ASCII	3	See list of routes and acronyms (last word NUL)
		16	Sample ?	Int	1 Byte	'1'=TRUE, '0'=FALSE (Least Significant Byte)
		16	Compliant ?	Int	1 Byte	'1'=TRUE, '0'=FALSE (Most Significant Byte)
		17	Spare	Int	4	

Table 8.4-2. PLC Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.4.4	Transfer Car Pick List Item (priority is from the sequence of the the Container List)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 13
		4	# Pick List Items	Int		Count of pick list following, 1-50
		5	Container Identification(s)	ASCII	8	Bar Code label, may be padded with NUL's
5.4.5	LLW Shipping Pick List Item (priority is from the sequence of the the Container List)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 13-405
		4	# Pick List Items	Int		Count of pick list following, 1-50
		5	Container Identification(s)	ASCII	8-400	Bar Code label, may be padded with NUL's
5.4.6	TRU Shipping Pick List Item (priority is from the sequence of the the Container List)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		6
		3	Message Length	Int		Number of words in the message, 13-405
		4	# Pick List Items	Int		Count of pick list following, 1-50
		5	Container Identification(s)	ASCII	8-400	Bar Code label, may be padded with NUL's
5.4.7	TRUPACT Assembly Pick List Item (priority is from the sequence of the the Container List)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		7
		3	Message Length	Int		Number of words in the message, 13-405
		4	# Pick List Items	Int		Count of pick list following, 1-50
		5	Container Identification(s)	ASCII	8-400	Bar Code label, may be padded with NUL's
5.4.8	BWAS Assay Started	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		8
		3	Message Length	Int		Number of words in the message, 4

Table 8.4-2. PLC Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.4.9	BWAS Assay Aborted	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		9
		3	Message Length	Int		Number of words in the message, 4
5.4.10	BWAS Assay Completed	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		10
		3	Message Length	Int		Number of words in the message, 4
5.4.11	Status of BWAS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		11
		3	Message Length	Int		Number of words in the message, 39
		4	Equip. Status Value	BCD		Correspond to states, see NetCom table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple status msgs
5.4.12	Status of DMS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		12
		3	Message Length	Int		Number of words in the message, 39
		4	Equip. Status Value	BCD		Correspond to states, see Netcom table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple status msgs
5.4.13	Status of SIE System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		13
		3	Message Length	Int		Number of words in the message, 39
		4	Equip. Status Value	BCD		Correspond to states, see Netcom table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple status msgs

Table 8.4-2. PLC Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.4.14	Criticality Alert (Note: stop all container movement and abort assay processing)	0	Message Sequence #	Int	—	Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		14
		3	Message Length	Int		Number of words in the message, 15
		4	Container Identification	ASCII	8	Bar Code label, may be padded with NUL's
		12	Alarm Level	Int		Pu Quantity in grams. Format: 1st word, mantissa, 2nd word, decimal
		14	Criticality Location	Int		See enumerated table of locations, Appendix B, Section 10 of PSDD
5.4.15	Empty Drum Process Route	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		15
		3	Message Length	Int		Number of words in the message, 14
		4	Container Identification	ASCII	8	Bar Code Label, padded with NUL's
		5	Process Route	ASCII	2	See list of routes and acronyms

Table 8.4-2. PLC Message Formats: Messages sent from Data Management System (DMS) to Plant Control System (PCS)

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.4.16	Retrieve Empty Pallet	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		16
		3	Message Length	Int		Number of words in the message, 39
		4	Container Location	Int		See enumerated list of locations, Appendix B, Section 10 of PSDD
		5	Pallet BIN Location	ASCII	2	Format described in Section 5.8.
5.4.17	Facility Curie Level (Note: does NOT stop container movement or abort assay processing)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		17
		3	Message Length	Int		Number of words in the message, 7
		4	Dosage Equivalent (curies)	Int		Pu quantity in curies (0-1000). Format: 1st word, mantissa, 2nd word, decimal
		6	Alarm Existing	Int		'1'=TRUE, '0'=FALSE
5.4.18	DMS Alarm to the PCS	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		4
		2	Specific Message Number	Int		18
		3	Message Length	Int		Number of words in the message, 39
			Equip Status Value	BCD		Correspond to States, See NETCOM Table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple messages
5.4.19	Spare					

Table 8.4-3. PLC Message Formats: Plant Control System (PCS) to Automated Guided Vehicle (AGV) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.5.1	Request Status of AGV System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 4
5.5.2	Request Location of an AGV	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 5
		4	AGV To get Location of	Int		'1'=NDE/NDA AGV, '2'=Process AGV
5.5.3	AGV Transport Command (Note: "UNKNOWN" as pickup or dropoff location means that this command is just a dropoff or pickup command - not a combined command)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 17
		4	AGV To Command	Int		'1'=NDE/NDA AGV, '2'=Process AGV
		5	Drum PIN	ASCII	8	Bar code label, may be padded with NUL's
		13	Pickup Location	Int		See enumerated table of locations, Appendix B, Section 10 of PSDD
		14	Pickup Request or Command	ASCII		'R'=Request, 'C'=Command
		15	Dropoff Location	Int		See enumerated table of locations, Appendix B, Section 10 of PSDD
		16	Dropoff Request or Command	ASCII		'R'=Request, 'C'=Command
5.5.4	S/R/NDE/NDA Door Is Opened	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 4
5.5.5	Request Transport Queue of AGV System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 5
		4	AGV to get Queue of	Int		'1'=NDE/NDA, '2'=Process

Table 8.4-3. PLC Message Formats: Plant Control System (PCS) to Automated Guided Vehicle (AGV) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.5.6	Disable all AGV Movement (This occurs when the PCS gets a Fissile Material or Criticality alarm)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		6
		3	Message Length	Int		Number of words in the message, 5
		4	AGV to Disable	Int		'1'=NDE/NDA, '2'=Process
5.5.7	Enable all AGV Movement (Sent manually from operators after alarm is cleared)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		7
		3	Message Length	Int		Number of words in the message, 5
		4	AGV to Enable	Int		'1'=NDE/NDA, '2'=Process
5.5.8	Status of PCS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		8
		3	Message Length	Int		Number of words in the message, 39
		4	Equip. Status Value	BCD		corresponds to states, see Netcom table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple status msgs
5.5.9	Release AGV from P & D Location	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		9
		3	Message Length	Int		Number of words in the message, 5
		4	AGV to Release	Int		'1'=NDE/NDA, '2'=Process
5.5.10	Advance AGV (at Glovebox HOLD_POINT Location)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		10
		3	Message Length	Int		Number of words in the message, 5
		4	AGV to Advance	Int		Only valid for '2'=Process

Table 8.4-3. PLC Message Formats: Plant Control System (PCS) to Automated Guided Vehicle (AGV) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.5.11	Airlock Conveyor Status	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		5
		2	Specific Message Number	Int		11
		3	Message Length	Int		Number of words in the message, 6
		4	Airlock Conveyor "A" Status	ASCII	1	"F", "R", "X" ("F"orward to Process, "R"everse from Process, "X"=disabled or in maintenance
		5	Airlock Conveyor "B" Status	ASCII		"F", "R", "X" ("F"orward to NDE/NDA, "R"everse from NDE/NDA, "X"=disabled or in maintenance

Table 8.4-4. PLC Message Formats: Automated Guided Vehicle (AGV) to Plant Control System (PCS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.6.1	Status of AGV System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		6
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 39
		4	Status Value	BCD		Corresponds to states, see Netcom table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple status mesgs.
5.6.2	Location of AGV System (This message is transmitted whenever the AGV changes drum carrying state in addition to when arriving at P&D location or in response to a location request) Roller Deck #1 is closest to the control cabinet (large vertical box) on the AGV	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		6
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 26
		4	AGV Reporting Location	Int		'1'=NDE/NDA AGV, '2'=Process AGV
		5	Pickup Location	Int		See enumerated table of locations, Appendix B, Section 10 of PSDD
		6	Dropoff Location	Int		See enumerated table of locations, Appendix B, Section 10 of PSDD
		7	Roller Deck Using	Int		'0', '1', or '2' (Deck PU / DO refers to)
		8	Which location is AGV at	Int		'1'=at Pickup, '2'=at Dropoff, '3'=in Transit
		9	# of Drums on AGV	Int		'0', '1', or '2'
		10	Roller Deck #1 Drum PIN	ASCII	8	Bar Code Label, may be padded with NUL's
		18	Roller Deck #2 Drum PIN	ASCII	8	Bar Code Label, may be padded with NUL's
5.6.3	Request to Open S/R/NDE/NDA Door	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		6
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 4
5.6.4	Ok to Close S/R/NDE/NDA Door	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		6
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 4

Table 8.4-4. PLC Message Formats: Automated Guided Vehicle (AGV) to Plant Control System (PCS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.6.5	Transport Request Received Confirmation	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		6
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 7
		4	AGV Transporting	Int		'1'=NDE/NDA AGV, '2'=Process AGV
		5	Roller deck drum is on	Int		'1' or '2'
		6	Length of Queue	Int		# requests waiting to occur
5.6.6	Transport Queue List in AGV (Pickup or Dropoff may be UNKNOWN for S/R/NDE/NDA area)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		6
		2	Specific Message Number	Int		6
		3	Message Length	Int		Number of words in the message, 16 - ?
		4	AGV Reporting Queue	Int		'1'=NDE/NDA AGV, '2'=Process AGV
		5	Queue Length	Int		Int (fields #5, #6, #7 repeated this many times)
		6	Pickup Location	Int		See enumerated table of locations, Appendix B, Section 10 of PSDD
		7	Dropoff Location	Int		See enumerated table of locations, Appendix B, Section 10 of PSDD
		8	Drum PIN	ASCII	8	Bar code label, may be padded with NUL's
5.6.7	AGV Transport Command (Note: "UNKNOWN" as pickup or dropoff location means that this command is just a dropoff or pickup command - not a combined command)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		6
		2	Specific Message Number	Int		7
		3	Message Length	Int		Number of words in the message, 17
		4	AGV Command From	Int		'1'=NDE/NDA AGV, '2'=Process AGV
		5	Drum PIN	ASCII	8	Bar code label, may be padded with NUL's
		13	Pickup Location	Int		See table of locations and acronyms
		14	Pickup Request or Command	ASCII		'R'=Request, 'C'=Command
		15	Dropoff Location	Int		See table of locations and acronyms
		16	Dropoff Request or Command	ASCII		'R'=Request, 'C'=Command

Table 8.4-5. PLC Message Formats: Plant Control System (PCS) to Automated Stacking / Retrieving Systems (AS/RS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.7.1	Request Status of ASRS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 4
5.7.2	Display Message Text at AS/RS Pallet Stand Local Display	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 4
		4	Message Text	ASCII	16	Actual message to display
5.7.3	Display Message Text at AS/RS Transfer Car Local Display	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 5
		4	Message Text	ASCII	16	Actual message to display
5.7.4	Spare					
5.7.5	ID of Drums to store at Pallet Stand (Variable length message, valid values for Number field are 1 - 4)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 13-37
		4	Number of Drum ID's	Int		Number Drum ID's following to store at Pallet
		5	Drum Identification	ASCII	8-32	bar code label
5.7.6	ID of Drum to Retrieve to Pallet Stand (Up to 4 drums retrieved, PCS also sends display message 5.7.2 "TRANSFER TO PROCESS")	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		6
		3	Message Length	Int		Number of words in the message, 12
		4	Drum Identification	ASCII	8	bar code label
5.7.7	Spare					
5.7.8	Spare					
5.7.9	Spare					

Table 8.4-5. PLC Message Formats: Plant Control System (PCS) to Automated Stacking / Retrieving Systems (AS/RS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.7.10	ID of Drum to Retrieve to Transfer Car (Up to 4 drums retrieved, PCS also sends display message 5.7.3 to ASRS TC display "TRANSFER TO PROCESS")	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		10
		3	Message Length	Int		Number of words in the message, 12
		4	Drum Identification	ASCII	8	bar code label
5.7.11	ID of Drum to store at TransferCar (Variable length message)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		11
		3	Message Length	Int		Number of words in the message, 13-37
		4	Number of Drum ID's	Int		Number Drum ID's following to store at Pallet
		5	Drum Identification	ASCII	8-32	bar code label
5.7.12	Spare					
5.7.13	Spare					
5.7.14	Spare					
5.7.15	Status of PCS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		15
		3	Message Length	Int		Number of words in the message, 39
		4	Equip. Status Value	BCD		corresponds to states, see table 8-5
		6	Software Error Code	Int		Integer
		7	Equip. Status Message	ASCII	32	Note: Multiple errors sent as multiple status msgs
5.7.16	Request AS/RS Drum Database (used for PCS database restoration)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		16
		3	Message Length	Int		Number of words in the message, 4
5.7.17	Disable all ASRS Drum Movement (When PCS gets Fissile Material alarm)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		17
		3	Message Length	Int		Number of words in the message, 4
5.7.18	Enable all ASRS Drum Movement (Sent manually after material alarm Cleared)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		7
		2	Specific Message Number	Int		18
		3	Message Length	Int		Number of words in the message, 4

Table 8.4-6. PLC Message Formats: Automatic Stacking / Retrieving Systems (AS/RS) to Plant Control System (PCS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.8.1	Status of ASRS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		8
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 39
		4	Status Value	BCD		Correspond to states, see table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple messages
5.8.2	ASRS Stored Pallet from Pallet Stand Confirmation	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		8
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 15-39
		4	Pallet Storage Location	ASCII		Format described at end of this section
		6	Number Drums on Pallet	Int		Int (# of Containers following, 0-4)
		7	Drum Identifications	ASCII	8-32	Bar Code label, may be padded with NUL's. This field is repeated NumberDrum times.
5.8.3	ASRS Retrieved Pallet to Pallet Stand Confirmation	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		8
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 15-39
		4	Pallet Storage Location	ASCII		Format described at end of this section
		6	Number Drums on Pallet	Int		Int (# of Containers following, 0-4)
		7	Drum Identifications	ASCII	8-32	Bar Code label, may be padded with NUL's. This field is repeated NumberDrum times.
5.8.4	ASRS Stored Pallet from Transfer Car Confirmation	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		8
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 15-39
		4	Pallet Storage Location	ASCII		Format described at end of this section
		6	Number Drums on Pallet	Int		int (# of Containers following, 0-4)
		7	Drum Identifications	ASCII	8-32	Bar Code label, may be padded with NUL's. This field is repeated NumberDrum times.

Table 8.4-6. PLC Message Formats: Automatic Stacking / Retrieving Systems (AS/RS) to Plant Control System (PCS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.8.5	ASRS Retrieved Pallet to Transfer Car Confirmation	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		8
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 15-39
		4	Pallet Storage Location	ASCII		Format described at end of this section
		6	Number Drums on Pallet	Int		int (# of Containers following, 0-4)
		7	Drum Identifications	ASCII	8-32	Bar Code label, may be padded with NUL's. This field is repeated NumberDrum times.
5.8.6	ASRS Drum Database (Note: Message to be divided into (3) PLC data files and sent as (3) Separate messages: 18 pallets into 1st file --720 words 18 pallets into 2nd file--720 words 18 pallets into 3rd file--720 words)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		8
		2	Specific Message Number	Int		6
		3	Message Length	Int		Number of words in the message, 15-439
		4	Number of Pallets	Int		int, number of pallet groups following, 0-54
		5	Message Number	Int	1	"1" = message for 1st 18 pallets, "2" = message for 2nd 18 pallets, "3" = message for 3rd 18 pallets
		6	Pallet Storage Location	ASCII	3	Format described in Netcom (last word NUL)
		9	# of Drums on Pallet	Int	2	0 - 4 are valid, drum ID below repeated this # (2nd word NUL)
		11	Drum Identification	ASCII	8-32	bar code label
		42	Spare	Int	3	Spare

Table 8.4-7. PLC Message Formats: Plant Control System (PCS) to Packet Assay Monitor (PAM) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.9.1	Request Status of PAM System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		9
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 4
5.9.2	Enable (Start) Packet Assay Monitor System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		9
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 12
		4	Matrix Type Calibration	ASCII		format TBD, menu selection from an OIU
5.9.3	Send Packet Assay Results	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		9
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 4
5.9.4	Reset Packet Assay Monitor (Stopping any assay in progress, this may be called upon Fissile or Critical Material alarm conditions)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		9
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 4
5.9.5	Status of PCS System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		9
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 39
		4	Equip. Status Value	BCD		corresponds to states, see table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple status msgs

Table 8.4-8. PLC Message Formats: Packet Assay Monitor (PAM) to Plant Control System (PCS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.10.1	Status of PAM System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		10
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 39
		4	Status Value	BCD		Correspond to states, see Netcom table 8-5
		6	Software Error Code	Int		Integer
		7	Status Message	ASCII	32	Note: Multiple errors sent as multiple statues
5.10.2	Packet Assay Monitor Results	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		10
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 8
		4	Pu 240 Effective Mass	Int		Assay results transmitted is in grams. Format: 1st word, mantissa, 2nd word, decimal
		6	Uncertainty	Int		Uncertainty in absolute +/- grams (1 standard deviation). Format: 1st word, mantissa, 2nd word, decimal

Table 8.4-9. PLC Message Formats: Plant Control System (PCS) to Passive Active Neutron System (PAN) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.11.1	Request Status of PAN System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.11.2	Abort PAN Assay	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.11.3	Request to Drop off Drum	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.11.4	Ready to Pickup Drum, Start Conveyor	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.11.5	Stop Drum Transfer Conveyor (due to drum out)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.11.6	Ready to Observe Strike Shape, Initiate Neutron Pulse (sent by Operator Control Station)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		6
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')

Table 8.4-9. PLC Message Formats: Plant Control System (PCS) to Passive Active Neutron System (PAN) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.11.7	Neutron Pulse Strike Shape GOOD (sent by Operator Control Station)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		7
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.11.8	Neutron Pulse Strike Shape BAD (sent by Operator Control Station)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		8
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.11.9	Stop Drum Transfer Conveyor (due to transfer trouble)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		11
		2	Specific Message Number	Int		8
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')

Table 8.4-10. PLC Message Formats: Passive Active Neutron System (PAN) to Plant Control System (PCS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.12.1	Status of PAN System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		12
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 40
		4	PAN System Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
		5	Status Value	BCD		see table Netcom 8-5
		7	Software Error Code	Int		Integer
		8	Status Message	ASCII	32	Note: Multiple errors sent as multiple Statuses
5.12.2	Ready to Accept Drum Transfer, Conveyor Started	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		12
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.12.3	Drum Presence Sensed in Station Conveyor Stopped	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		12
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')
5.12.4	Request Neutron Pulse for Strike Shape Validation	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		12
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 5
		4	PAN Station Letter	ASCII		Which PAN subsystem (currently 'A' or 'B')

Table 8.4-11. PLC Message Formats: Plant Control System (PCS) to Gamma Energy Assay System (GEA) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.13.1	Request Status of GEA System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		13
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')
5.13.2	Abort GEA Assay	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		13
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')
5.13.3	Request to Drop off Drum	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		13
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')
5.13.4	Ready to Pickup Drum, Start Conveyor	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		13
		2	Specific Message Number	Int		4
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')
5.13.5	Stop Drum Transfer Conveyor (due to drum out)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		13
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')

Table 8.4-11. PLC Message Formats: Plant Control System (PCS) to Gamma Energy Assay System (GEA) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.13.6	Stop Drum Transfer Conveyor (due to transfer trouble)	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		13
		2	Specific Message Number	Int		5
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')

Table 8.4-12. PLC Message Formats: Gamma Energy Assay System (GEA) to Plant Control System (PCS) Messages

Msg #	Message Description	Word #	Data Description	Data Type	Size, Words (N Register)	Allowed Values / Comments
5.14.1	Status of GEA System	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		14
		2	Specific Message Number	Int		1
		3	Message Length	Int		Number of words in the message, 40
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')
		5	Status Value	BCD		see table Netcom 8-5
		7	Software Error Code	Int		Integer
		8	Status Message	ASCII	32	Note: Multiple errors sent as multiple statues
5.14.2	Ready to Accept Drum Transfer, Conveyor Started	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		14
		2	Specific Message Number	Int		2
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')
5.14.3	Drum Presence Sensed in Station Conveyor Stopped	0	Message Sequence #	Int		Unique sequence number for each message
		1	General Message Number	Int		14
		2	Specific Message Number	Int		3
		3	Message Length	Int		Number of words in the message, 5
		4	GEA System Letter	ASCII		Which GEA subsystem (currently 'A' or 'B')

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8.5 MESSAGING DETAILS

Additional messaging information is provided in the tables below. Table 8.5-1 is an alphabetical list of all NETCOM message acronyms. Table 8.5-2 lists all WRAP location codes. Table 8.5-3 contains a listing of all equipment status values. Table 8.5-4 lists software error values and messages. Table 8.5-5 provides a list of all bar code data identifiers and data qualifiers. Table 8.5-6 records the pick list route designations. Table 8.9-1 lists the Internet Protocol (IP) computer addresses assigned at WRAP.

Table 8.5-1. Message Specific Types – Alphabetical List

Acronym	Message Description
AAGV	Advance AGV at Glovebox HOLD_POINT Location
ABWA	Abort a BWAS Assay
ACC	Aerosol Can to Collection Container Relationship
ACS	Airlock Conveyor Status
ADDB	AS/RS Complete Drum Database
ADDT	Add Items to Transfer Stand
AFUL	ASRS Full (No locations available for pallet storage)
AGEA	Abort a GEA Assay
AGVL	Location of AGV System
ALRM	DMS Alarm to the PCS
APAN	Abort a PAN Assay
ASPP	ASRS Has stored a pallet from Pallet Stand Confirmation
ARPP	ASRS Has Retrieved a Pallet to Pallet Stand Confirmation
ASPT	ASRS Has stored a pallet from Transfer Car Confirmation
ARPT	ASRS Has Retrieved a Pallet to Transfer Car Confirmation
BAA	BWAS Assay Aborted
BAC	BWAS Assay Completed
BAS	BWAS Assay Started
CDBI	Container Database Information
CL	Waste Container Location Update
CLW	Waste Container Location with Container Weight
CRBD	Confirm Request to Retrieve Buffer Carousel Drum
CRIT	Criticality Alert
DAGV	Disable AGV Movement (due to critical fissile material)
DASR	Disable ASRS Movement (due to critical fissile material)
DCS	Overpack Drum Contamination Status
DPS	Drum presence sensed (can stop conveyors)
DMPS	Display Message Text at AS/RS Pallet Stand Local Display
DMTC	Display Message Text at AS/RS Transfer Car Local Display
DTC	AGV Transport Command
EAGV	Enable AGV Movement (after critical fissile material)
EASR	Enable ASRS Movement (after critical fissile material)
EDPR	Empty Drum Process Route
EPAM	Enable (Start) Packet Assay Monitor System
FIL	Fissile Inventory Level in Glovebox (incl. possible alarm)
FCL	Facility Curie Level

Table 8.5-1. Message Specific Types – Alphabetical List

Acronym	Message Description
FRSC	Request system to stop conveyor due to failure/trouble
INP	PAN System needs to Initiate Neutron Pulse
LSPL	LLW Shipping Pick List Item
NCIP	Non-Compliant Item to Packet Relationship
NCIT	Non-Compliant Items presented for treatment, display DMS instrct
NDO	S/R/NDE/NDA Door Is Opened
NPB	Neutron Pulse / Strike Shape Bad
NPG	Neutron Pulse / Strike Shape Good
OCD	OK to Close S/R/NDE/NDA Door (from AGV)
OCW	Overpack Cumulative Weight
ORSC	Request system to stop conveyor due to drum out
PAMR	TRU Packet Assay Monitor Results
POPD	Puck and Overpack Drum Relationship
PPL	Purge Port Location Update
PPLI	Processing Pick List Item
PPTP	Purge Port and Transfer PIG Relationship
QUEI	AGV Transport Queue List Item
RAD	Ready to Accept Drum (PAN / GEA)
RADB	Request AS/RS Drum Database
RAL	Request Location of an AGV
RAGV	Request Status of AGV System
RAPD	Release AGV from P & D Location
RASR	Request Status of AS / RS System
RBWA	Request Status of BWAS System (through DMS)
RDOD	Request PAN / GEA system allow PCS to drop off a drum
RDMS	Request Status of DMS System
RDPS	Retrieve Drum to Pallet Stand
RDTC	Retrieve Drum to Transfer Car
REMT	Remove Items from Transfer Stand
RGEA	Request Status of a GEA System (through DMS)
RNP	Request Neutron Pulse for Strike Shape Validation
ROD	Request to Open S/R/NDE/NDA Door
RPUD	Ready to Pick up a drum, please start conveyor
RPAM	Request Status of Packet Assay Monitor System
RPAN	Request Status of a PAN System (through DMS)
RPCS	Request Status of PCS System
RQUE	Request Transport Queue of an AGV
RSIE	Request Status of SIE System (through DMS)
RSTP	Reset Packet Assay Monitor
RTMT	Retrieve Empty Pallet
RWPT	Restricted Waste Packet & Transfer Drum Relationship
RWPP	Restricted Waste Packet & Parent Drum Relationship
SAGV	Status of Automated Guided Vehicle System
SASR	Status of Automatic Stacking Retrieving System
SBWA	Status of BWAS System (through DMS)
SDMS	Status of DMS System
SDPS	ID of Drum to store at Pallet Stand
SDTC	ID of Drum to store at Transfer Car

Table 8.5-1. Message Specific Types – Alphabetical List

Acronym	Message Description
SGEA	Status of a GEA System (through DMS)
SNDA	Status of NDA System (through DMS)
SPAM	Status of Packet Assay Monitor System
SPAN	Status of a PAN System (through DMS)
SPAR	Send Packet Assay Results
SPCS	Status of PCS System
SPDP	Sample and Parent Drum / Packet Relationship
SPP	Sample and Purge Port Relationship
SSIE	Status of SIE System (through DMS)
TAC	TRUPACT Assembly Complete
TAPL	TRUPACT Assembly Pick List Item
TCIC	Treatment Container & Item Container Relationship
TCLD	Treatment Container and Loadout Drum Relationship
TCPL	Transfer Car Pick List Item
TRCV	Transport Request Received Confirmation (from AGV)
TRSP	Samples Presented for Treatment & PurgePort Relationship
TSPL	TRU Shipping Priority Pick List Item
End of Table	

Table 8.5-2. WRAP Module 1 Locations and Network Packet Acronym (sorted alphabetically)

Location	String Acronym (max length=10)
TRUPACT Payload Accumulation Conveyor 101-CV-05-104	ACCVYR
AGV P&D at Airlock Conveyor In NDE/NDA Area (Xfr To Process) CV-09-103A	AGVAIRC_A1
AGV P&D at Airlock Conveyor In Process (Xfr To Process) CV-09-201A	AGVAIRC_A3
AGV P&D at Airlock Conveyor In Process. Area (Xfr To NDE/NDA) CV-09-201B	AGVAIRC_B1
AGV P&D at Airlock Conveyor in NDE/NDA area (Xfr To NDE/NDA) CV-09-103B	AGVAIRC_B3
AGV P&D at Background Drum Storage Conveyor 104-CV-09-105A	AGVBDC_A
AGV P&D at Background Drum Storage Conveyor 104-CV-09-105B	AGVBDC_B
AGV P&D at S&R Drum Discharge Conveyor 101-CV-05-102	AGVDISCVR
AGV P&D at Empty Drum Infeed Conveyor 101-CV-05-105	AGVEMPINFC
AGV P&D at Conveyor 104-CV-09-101E (for GEA_A)	AGVGEAC_A
AGV P&D at Conveyor 104-CV-09-101F (for GEA_B)	AGVGEAC_B
On AGV at Hold Point Loc. At West End Of Proc. Glovebox Lines	AGVHOLDPNT
AGV P&D at S&R Drum Infeed Conveyor 101-CV-05-101B	AGVINFDC_B
AGV P&D at LLW Entry Glovebox Port/Lift Table LT-09-202A	AGVLLWENTR
AGV P&D at LLW Exit Glovebox Loadout Position/Lift Table LT-09-202C	AGVLLWEXIT
AGV P&D at LLW Transfer Port/Lift Table For RWM xfer Drums LT-09-203A	AGVLLWRWX
AGV P&D at LLW RWM Compliant Waste Loadout Port/Lift Table LT-09-201E	AGVLLWRWCL
AGV P&D at LLW RWM Transfer Drum Port/Lift Table LT-09-201F	AGVLLWRWEN
AGV P&D at LLW RWM Treated Waste Loadout Port/Lift Table LT-09-201D	AGVLLWRWEX
AGV P&D at Conveyor CV-09-101A (for NDE_A)	AGVNDEC_A
AGV P&D at Conveyor CV-09-101B (for NDE_B)	AGVNDEC_B
AGV P&D at NDE/NDA Carousel 104-CV-09-102	AGVN_NCRSL
AGV P&D at Conveyor CV-09-101C (for PAN A)	AGVPANC_A

Table 8.5-2. WRAP Module 1 Locations and Network Packet Acronym (sorted alphabetically)

Location	String Acronym (max length=10)
AGV P&D at Conveyor CV-09-101D (for PAN B)	AGVPANC_B
AGV P&D at RWM Carousel In Processing Area 107-CV-09-202	AGVRWMCRSL
AGV P&D at 85-Gallon D&S Drum Staging Conveyor 107-CV-09-203	AGVSTGC_85
AGV P&D at 55-Gallon One Trip Drum Staging Conveyor 107-CV-09-204	AGVSTGC_55
AGV P&D at TRU Empty Drum Compaction Loadout Port/Lift Table LT-09-203C	AGVTRUCMPT
AGV P&D at TRU Entry Glovebox Port/Lift Table LT-09-202B	AGVTRUENTR
AGV P&D at TRU Exit Glovebox Loadout Position #1/Lift Table LT-09-202D	AGVTRULDO1
AGV P&D at TRU Exit Glovebox Loadout Position #2/Lift Table LT-09-202E	AGVTRULDO2
AGV P&D at TRU RWM Compliant Waste Loadout Port/Lift Table LT-09-201B	AGVTRURWCL
AGV P&D at TRU RWM Transfer Drum Port/Lift Table LT-09-201C	AGVTRURWEN
AGV P&D at TRU RWM Treated Waste Loadout Port/Lift Table LT-09-201A	AGVTRURWEX
AGV P&D at TRU Xfer Port/Lift Table For RWM Transfer Drums LT-09-203B	AGVTRURWX
Airlock Conveyor in General (for AGV Communications)	AIRCVYR
Airlock Conveyor In NDE/NDA Area (Xfr To Process) CV-09-103A	AIRCVYR_A1
Airlock Conveyor In Airlock (Xfr To Process) CV-09-104A	AIRCVYR_A2
Airlock Conveyor In Process (Xfr To Process) CV-09-201A	AIRCVYR_A3
Airlock Conveyor In Process Area (Xfr To NDE/NDA) CV-09-201B	AIRCVYR_B1
Airlock Conveyor In Airlock (Xfr To NDE/NDA) CV-09-104B	AIRCVYR_B2
Airlock Conveyor In NDE/NDA Area (Xfr To NDE/NDA) CV-09-103B	AIRCVYR_B3
Shipping / Receiving / NDE / NDA AGV Battery Charging Location	AGV1BATT
Process Area AGV Battery Charging Location	AGV2BATT
AS/RS Location	AS_RS
Background Drum Storage Conveyor 104-CV-09-105A	BDCVYR_A
Background Drum Storage Conveyor 104-CV-09-105B	BDCVYR_B
Box NDA Unit In The NDE/NDA Area	BOXNDA
Box NDE Unit In The NDE/NDA Area	BOXNDE
S&R Drum Discharge Conveyor 101-CV-05-102	DISCHCVR
S&R Drum Discharge Conveyor with Weigh Scale 101-CV-05-103B	DISCHCVRW
Empty Drum Storage Area (On South Side Of AS/RS Shield Wall)	EMPSTR
Empty Drum Infeed Conveyor 101-CV-05-105	EMPINFDCVR
Entire WRAP 1 Facility (for fissile material alarms)	FACILITY
GEA Unit in general (104-ND-06-102 A or B) (for AGV communication)	GEA
Eastern GEA Unit 104-ND-06-102A	GEA_A
Conveyor 104-CV-09-101E (for GEA_A)	GEA_A_CVYR
Western GEA Unit 104-ND-06-102B	GEA_B
Conveyor 104-CV-09-101F (for GEA_B)	GEA_B_CVYR
S&R Drum Infeed Conveyor 101-CV-05-101A	INFDCVYRA
S&R Drum Infeed Conveyor 101-CV-05-101B	INFDCVYRB
S&R Drum Weigh Scale Conveyor 101-CV-05-105A	INFDCVYRW
Waste Containers That are In Transit From WRAP 1	IN_TRANSIT
LLW SuperCompactor	LLW_CMPCT
LLW Entry Glovebox Port/Lift Table LT-09-202A	LLW_ENTRY
LLW Exit Glovebox Loadout Position/Lift Table LT-09-202C	LLW_EXIT
LLW Exit Port (Generic), either Process Glovebox or RWM Glovebox	LLW_GENEXT
Exterior Of LLW Sorting Glovebox At Purge Port Location	LLW_PP

Table 8.5-2. WRAP Module 1 Locations and Network Packet Acronym (sorted alphabetically)

Location	String Acronym (max length=10)
LLW Exit Glovebox Puck Receipt Position	LLW_PUCK
LLW Transfer Port/Lift Table For RWM Transfer Drums LT-09-203A	LLW_RWMPRT
LLW Sorting Glovebox	LLW_SORT
LLW Exit Glovebox Puck Storage Location #1	LLW_STORE1
LLW Exit Glovebox Puck Storage Location #2	LLW_STORE2
LLW Exit Glovebox Puck Storage Location #3	LLW_STORE3
LLW RWM Glovebox Purge Port Location	LLWRW_PP
LLW RWM Compliant Waste Loadout Port/Lift Table LT-09-201E	LLWRWCMPLT
LLW RWM Transfer Drum Port/Lift Table LT-09-201F	LLWRWENTRY
LLW RWM Treated Waste Loadout Port/Lift Table LT-09-201D	LLWRWEXIT
LLW RWM Glovebox Sample Location	LLWRWSAMPL
LLW RWM Glovebox Treatment Location	LLWRWTREAT
NDE Unit in general (104-ND-06-104A or B) (for AGV communication)	NDE
Eastern NDE Unit 104-ND-06-104A	NDE_A
Conveyor CV-09-101A (for NDE_A)	NDE_A_CVYR
Western NDE Unit 104-ND-06-104B	NDE_B
Conveyor CV-09-101B (for NDE_B)	NDE_B_CVYR
NDE/NDA Carousel 104-CV-09-102	N_NCRSL
PAN Unit in general (104-ND-06-101A or B) (for AGV communication)	PAN
Eastern PAN Unit 104-ND-06-101A	PAN_A
Conveyor CV-09-101C (for PAN A)	PAN_A_CVYR
Western PAN Unit 104-ND-06-101B	PAN_B
Conveyor CV-09-101D (for PAN B)	PAN_B_CVYR
AS/RS Pallet Stand	PSTND
Wrap 1 Receiving Dock	RECDCK
RWM Carousel In Processing Area 107-CV-09-202	RWM_CRSL
Storage Area For Excess 85-Gallon Drums	SHIPEMPSTR
WRAP 1 Shipping Dock	SHPDCK
SIE Computer System (System Integration Equipment)	SIE
85-Gallon D&S Drum Staging Conveyor 107-CV-09-203	STGCVR_85G
55-Gallon One Trip Drum Staging Conveyor 107-CV-09-204	STGCVR_55G
SWB Storage Area On South Side Of As/Rs Shield Wall	SWBSTR
TRUPACT Payload Staging Pallet Stand (Next To Discharge Conveyor)	TPSTAND
TRU Empty Drum Compaction Loadout Port/Lift Table LT-09-203C	TRU_COMPCT
TRU Entry Glovebox Port/Lift Table LT-09-202B	TRU_ENTRY
TRU Exit Port (Generic), either Process Glovebox or RWM Glovebox	TRU_GENEXT *
TRU Exit Glovebox Loadout Position #1/Lift Table LT-09-202D	TRU_LDOUT1
TRU Exit Glovebox Loadout Position #2/Lift Table LT-09-202E	TRU_LDOUT2
Exterior Of TRU Sorting Glovebox At The Purge Port Location	TRU_PP
TRU Transfer Port/Lift Table For RWM Transfer Drums LT-09-203B	TRU_RWMPRT
Entire TRU Glovebox (for fissile material alarms)	TRU_GLVEBX
TRU Sorting Glovebox	TRU_SORT
TRUPACT Shipping Bay Location For SWB Staging	TRUBAY

* Includes the following lift tables: LT-09-202D, LT-09-202E, LT-09-201A, LT-09-201B

Table 8.5-2. WRAP Module 1 Locations and Network Packet Acronym (sorted alphabetically)

Location	String Acronym (max length=10)
TRU RWM Compliant Waste Loadout Port/Lift Table LT-09-201B	TRURWCMPLT
TRU RWM Transfer Drum Port/Lift Table LT-09-201C	TRURWENTRY
TRU RWM Treated Waste Loadout Port/Lift Table LT-09-201A	TRURWEXIT
Process Area (for fissile material alarms)	AREA_3
TRU RWM Glovebox Sample Location	TRURWSAMPL
TRU RWM Glovebox Purge Port Location	TRURW_PP
TRU RWM Glovebox Treatment Location	TRURWTREAT
Unknown (used for AGV drum transfer commands)	UNKNOWN
AS/RS Transfer Car	XFRCAR
End of Table	

Table 8.5-3. General Equipment Status Values / Equipment States

Constant	Value
Functioning Properly	00000000
Minor Equipment Trouble - Schedule maintenance, but can continue operation	00000001
Equipment trouble in completing Task (AGV obstruction, pallet stand unavailable, transfer trouble, can't find pallet or drum, see error message)	00000002
Major Equipment Failure - Shut down / Aborting, see error message	00000004
Available for next task / Ready / Idle	00000010
Task in progress	00000020
Task Finished (may be waiting for removal of raw material)	00000040
Equipment Storage Nearly Full Warning (AS/RS, AGV Battery empty, DMS hard drive, Carousels)	00000100
Equipment Storage Full Alarm (AGV Battery empty, AS/RS, Carousels, etc.)	00000200
Emergency Stop Pressed	00000400
System Initialization State 1 (in process of booting up, wait)	00010000
System Initialization State 9 (fully initialized)	00090000
Equipment state should be considered an Event (GREEN)	00100000
Equipment state should be considered a Warning (YELLOW)	00200000
Equipment state should be considered an Alarm (RED)	00400000
Future status values	01000000 - 09000000
Future status values	10000000 - 90000000

Note: The status fields above are "grouped" in tens, with each type of status information becoming a digit in the status field. The first field of ten values (00000000 – 00000009) correspond to the equipment health status (OK, slight trouble, major problems); the next field of ten values (00000010 - 00000090) correspond to equipment operation status (In progress, finished, available for next). Three more fields of status values are reserved for future use. This techniques allows status constants to be added together to generate an overall status for the system. Thus, if a subsystem is fully initialized (00090000), has minor equipment trouble (00000001), has a task in progress (00000020), the minor alarm is considered a warning (00100000), a 00190021 will be sent as the system status value.

To provide a more consistent system error management with unique error numbers, all network systems should use reserved error numbers in the range specified in Table 8.5-4. The systems will provide tables enumerating the error value with a descriptive error message and noting any special resulting recovery actions.

Table 8.5-4. Software Error Values and Messages

System	Reserved Error Value Range
Plant Control System – PCS	0-999
Data Management System – DMS	1000-1999
Automated Guided Vehicle – AGV	2000 -2999
Boxed Waste Assay System – BWAS	3000 - 3999
Automatic Stacking / Retrieving System - AS/RS	4000 - 4999
Packet Assay Monitor – PAM	5000 - 5999
System Integration Equipment – SIE	10000-19999
Passive Active Neutron - PAN (A & B)	20000 - 24999
Gamma Energy Assay - GEA (A & B)	25000 - 29999

PCS software error message (64 char max)	Value	Special Resulting Action
(Blank - NUL)	0	Everything is Normal, no action
Lost Picklists	1	Retransmit all PickLists
Lost Database	2	Retransmit database information (as requested)
	3	
TBD	4	TBD
	5	
	6	
	7	
	8	
	9	
	10	
End of Table		

Table 8.5-5. Bar Code Data Identifiers and Data Qualifiers for WRAP 1

Data Name	Data Format	Data Identifier	Data Qualifier	Description / Comments	PCS Internal Enumerated Type
Container Package ID – Purge-port Container	CHAR(14) 2336-YY-3XXXXX	1B	PP	The unique package identification number that is assigned to a purge port container.	1
Container Package ID – Transfer Pig	CHAR(14) 2336-YY-4XXXXX	1B	TP	The unique package identification number that is assigned to a transfer pig.	2
Container Package ID – Packet	CHAR(14) 2336-YY-0XXXXX	20T	None	The unique package identification number that is assigned to a waste packet, including non-compliant items.	3
Container Package ID – Treatment Container	CHAR(14) 2336-YY-9XXXXX	23T	None	The unique package identification number (PIN) that is assigned to a treatment container.	5
Compacted Waste Puck ID	CHAR(6) PXXXXX	24T	None	The unique PIN assigned to a compacted waste puck as an operations aid. The original puck PIN is retained as the drum id.	6
Container Package ID - Drum or Box	CHAR(14)	S	None	The unique PIN that is assigned to the outer waste package. SWITS uses "S" data identifier for Container Package ID.	7
Bottle ID	CHAR(12) YY-XXXXX-XXL	1S	WP	The unique identification number that is assigned to a sample container/vial. The bar code label will also used by the analytical lab.	8
Command	CHAR(10) Example: END	Y	None	Bar coded command to the PCS to perform a specific action such as send data to the DMS. Also used to indicate the completion of a series of bar code inputs.	9
Location ID	CHAR(10) Example: SHPDCK	2Y	None	Location within WRAP 1 where a waste item or empty drum is stored or processed.	10

Note: The 2336 in the bar code label corresponds to the building (WRAP 1), the YY corresponds to the Year, XXXXXXX corresponds to a sequential number, the data identifier prefix and qualifier postfix are contained in the scanned bar code but not transmitted to the DMS. All bar codes printed out are padded out with spaces (ASCII 32) to be 14 characters long. Locations are padded out to 12 characters internally to the PCS and transmitted to the DMS. Existing bar codes may be less than 14 characters but will be padded to 14 internally to the PCS after scanning. Thus, as defined above, with the added prefix and postfix, a scanned bar code can be between 9 and 18 characters long. The data identifier and qualifier are not considered part of the bar code and are not transmitted to the DMS.

PCS internal Enumerated Type of '0' means unknown container / bar code type.

Table 8.5-6. Pick List Route Designations

PickList Route (4 char)	Route Description
1	NG TRU & LLW
2A, 2B	RET & NG Noncompliant TRU
3A, 3B	RET & NG Noncompliant LLW
4A, 4B	55-Gallon One Trip Empties
5A, 5B	85-Gallon Empties
6A, 6B	55-Gallon E/E Empties
7A	Background Drums through NDA A and back to Background Conveyor A
7B	Background Drums through NDA B and back to Background Conveyor B
8	Verification Drums
9	NDE Verification Only
101A, 101B	Drums picked up from exit gloveboxes 201A, 201B, 201D, 202D, or 202E for airlock conveyor delivery
102A, 102B	Drums picked up from exit gloveboxes 202C to 203C (Compacted Waste forms)
103A, 103B	Empty Overpack drums picked up at the entry gloveboxes

Note: The letter designation after the Route Number for all routes except 7 refers to the Process Airlock to use. Additional route designations will be created to handle outgoing drums from the process area.

8.6 MISCELLANEOUS NETWORK COMMUNICATION TOPICS

8.6.1 Data Management System (DMS) Menus Displayed on Plant Control System (PCS) Operator Control Stations

The operator control stations (OCS-101, 102, 103, 104, and 105) consist of X-Terminals running HP-RTAP software on an HP 9000 / 800 E45 UNIX server. The operators have the ability to call up DMS NDE and NDA Operational Menus by selecting ("clicking" on) graphical Icons on the X-Terminal displays. These Icons will start up a remote Oracle application allowing the user to login to the DMS host computer. After proper login, a shell script is started enabling the NDE, NDA, and possibly the BWAS menus to be displayed in a terminal window on the Operator Control Stations.

8.6.2 Time synchronization on the TCP / IP Network

The TCP/IP ***Time*** service will be used to allow all subsystems on the network to obtain consistent time values. The DMS will operate as the "time server" implementing the ***Time*** service through TCP port number 37. The DMS will return a time value in the form of a 32-bit integer representing the number of seconds elapsed since January 1, 1900 in Universal Coordinated Time (UCT). Each subsystem (client) on the Network will form a TCP connection

with the DMS computer (timeserver) and wait to read output. When the server detects a new connection, it sends the current time (encoded as an XDR integer), and then closes the connection. The subsystem does not need to send and data because the timeserver (DMS) never reads from the connection. This is the only case where the AGV, AS/RS, and PAM systems will communicate directly to the DMS. All other communications are first sent to the PCS, which then relays the necessary data to the DMS. The network systems running UNIX should note that the UNIX "base" or epoch time is January 1, 1970 while the UCT time base is January 1, 1900. Thus, the defined value 2208988800 (base 10) may need to be subtracted from the time server value to make the time representation compatible with the local machine. The Timeserver request should be made by each subsystem once every hour.

8.6.3 Congestion Potential on the WRAP LAN

All devices on the network will generate minimal network traffic except (potentially) for the X-Terminals (201-CNS-12-101, 102, 103, 104, and 105). During functional acceptance testing, network statistics will be monitored to evaluate the message traffic generated by the X-terminals. If determined that these devices are using an excessive amount of network capacity, the X-terminals will be routed to just the DMS and PCS systems (possibly with the router card on the Cabletron hub / router). Network traffic will be kept to less than 50 percent of total capacity.

8.6.4 String Lengths

All strings passed in the message packets described in section 8.2 are a multiple of four in length (4, 8, 12, 16, ...). This is done to ensure the Unix systems do not attempt to read a value starting at an odd byte address. Locations, even though are defined to be 12 characters long, will not exceed 10 characters. Container Package ID numbers (bar codes) are defined to be 16 characters in the message but will not exceed 14 characters. The last two characters of these strings are guaranteed to be an ASCII 0 (NUL) value.

8.6.5 Reserved Characters

The following characters are reserved due to their special meaning within application programs Oracle and HP-RTAP.

'~' (tilde)

These characters should not appear within any message.

8.7 SEQUENCE OF INFORMATION TRANSFER - NOTES

- Some messages, such as the Pick Lists, will have repeated fields within the message. The Container Location command, for instance will have a number of containers field which corresponds to the number of bar-coded container ID's that occur at the end of the message. The pick list must be transferred in its entirely as the pick list contained in a group overwrite the previous one within the PCS. The PCS will be able to re-route drums in process through operator modification of the pick list.

- Some messages, such as Container Location Updates (CL) from the DMS, will have different interpretations depending upon the location acronym passed with the message. A CL message from the DMS may tell the PCS that a Drum has been accepted into the WRAP process by updating its location ID. These interpretations will be as defined in Wrap 1 Computer System Interface Definition Document, Project W026 and Hanford WRAP Contract Specification Section 13462.

- The PCS will poll subsystems approximately once a minute for status checks. Equipment ready / idle, busy, or storage full information (AS/RS, PAM, etc.) is received from these status requests. Equipment errors are received from a general status message, which will include an error string. These errors will include items such as "AS / RS Pallet Stand Unavailable" (trouble completing task) and "AS / RS can't find Drum" (trouble completing task). The subsystem should send a status message whenever a significant change of state occurs, without waiting for a status poll.

- Any abnormal status check (including communication errors) from a system will result in the error message being stored in an alarm / event log on the PCS system and printed out on the PCS system printer. Note that re-transmission timers are an integral part of TCP / IP (as discussed in Section 8.8) and will cause messages to be re-sent on a no-acknowledgement time-out condition.

- With the AGV system, when possible, issuing the Pickup and Drop-off commands as part of one Transport command allows the AGV system to optimize its drum transportation paths and sequences. This command will allow the AGV system to know the complete path for each drum in its transport queue. This also ensures that all drum transport commands have both a source and destination and will not get left on the AGV. The AGV system will have Pickup and Drop-off commands issued separately for NDE/NDA area transport in order to allow for the AGV to automatically pickup a drum and transport it to the buffer storage carousel if it has not received a dropoff command within a preset period of time (due to equipment being unavailable).

8.8 DEFINITION OF NETWORK PROTOCOL

- The network between the subsystems will be 10-Base-T (twisted-pair) Ethernet conforming to IEEE 8022. The network will be in a "star" arrangement with individual cables running to each subsystem host from a CISCO MMAC Hub / Router.

- The Internet Protocol (IP) will be used3.

- All messages between subsystems will be sent using the TCP protocol4.

- Data transfer messages defined in section 8.2 will use the "Stream Socket" Application Programming Interface (API) over a TCP connection.

- All data contained in "socket" messages will be formatted according to Section 8.2.2.

- Ad-hoc tools such as "ping", "ifconfig", "traceroute", "netstat", and "arp" will be used to maintain and troubleshoot the WLAN. Additionally, it may be desired to use the Simple Network Management Protocol (SNMP) to administer and manage the WLAN. A Management Information Base (MIB) would then be created on the Plant Control System (PCS) defining the objects that can be managed in the TCP / IP WLAN. Additionally, the CISCO router has software tools available for network diagnostics and management.

- Hosts and router control messages (such as error condition reporting and routing configurations) will use the ICMP protocol5.

- Status request messages will sent at regular intervals from the Plant Control System (PCS) to all PCS subsystems on the WLAN (AGV, PAM, AS/RS) along with the GEA, and PAN subsystems. Additional status requests (or NULL messages) should be sent from the DMS to the PCS, SIE, and BWAS host computers. This will allow for broken connections to be detected as soon as possible. Additionally, audible and visual alarms will be generated at the Operator Control Stations (OCS) in the event of network connection difficulties. The entire network will use TCP / IP for transmission and verification, all communications applications need to ensure that their assigned TCP port connections stay open.

8.9 NETWORK CONFIGURATION

8.9.1 Network Class and Address

The network will be attached to the Hanford Class "B" address with subnetting (the subnet address mask will be 255.255.255.0). The subnet will be 130.97.238.0. The subnet will be 130.97.238.0 IP addressed will be allocated within a range of 130.97.238.61 through 130.97.238.110 and 130.97.238.162 through 130.97.238.172. These addresses are static. Also available are the addresses in limited number of 130.97.238.11 through 130.97.238.49. These addresses are currently reserved for LMSI use but can be used sparingly. The Hanford WLAN is, however, large enough that using "hosts" text files on each host to perform name resolution is an unmanageable task and name resolution will be accomplished with Site Domain Name

Servers. The site DNS server is located at IP address 130.97.100.11, port 53. All systems on the site WLAN will use the DNS server to obtain internet addresses from the simple domain names. The high-level domain name for the Hanford site is "rl.gov".

8.9.2 Host Names and Network Addresses

The host names, Internet addresses, and Transport Layer Protocol Ports for each subsystem are defined in Table 8.9-1.

Table 8.9-1. WRAP IP Address Log

Node	Host Name	Internet Address	Host TCP Port Number	Host TCP Port Description
DMS	dms	130.97.238.21	Ephemeral	Port to PCS
			Ephemeral	Port to SIE
			Ephemeral	Port to BWAS
PCS	pcs	130.97.238.22	5010	Port to DMS
			Ephemeral	Port to AGV
			Ephemeral	Port to AS/RS
			Ephemeral	Port to PAM
			Ephemeral	Port to PAN_A
			Ephemeral	Port to PAN_B
PCS	pcs	130.97.238.22	Ephemeral	Port to GEA_A
			Ephemeral	Port to GEA_B
			Ephemeral	Port to SIE
			Ephemeral	Port to LCU101
			Ephemeral	Port to LCU102
			Ephemeral	Port to LCU103
			Ephemeral	Port to LCU104
AGV	agv	130.97.238.25	5020	Port to PCS
ASRS	asrs	130.97.238.26	5021	Port to PCS
PAM	pam	130.97.238.27	5022	Port to PCS
SIE	sie	130.97.238.28	5040	Port to DMS
			Ephemeral	Port to GEAA
			Ephemeral	Port to GEAB
			Ephemeral	Port to PANA
			Ephemeral	Port to PANB
GEAA	geaa	130.97.238.31	5050	Port to SIE
			5051	Port to PCS
GEAB	geab	130.97.238.32	5060	Port to SIE
			5061	Port to PCS
PANA	pana	130.97.238.41	5070	Port to SIE
			5071	Port to PCS
PANB	panb	130.97.238.42	5080	Port to SIE
			5081	Port to PCS
BWAS	bwas	130.97.238.68	5090	Port to DMS
LCU101	lcu101	130.97.238.101	5101	Port to PCS
LCU102	lcu102	130.97.238.102	5102	Port to PCS

Table 8.9-1. WRAP IP Address Log

Node	Host Name	Internet Address	Host TCP Port Number	Host TCP Port Description
LCU103	lcu103	130.97.238.103	5103	Port to PCS
LCU104	lcu104	130.97.238.104	5104	Port to PCS
OCS101	ocs101	130.97.238.61	TBD	X-Terminal to PCS
OCS102	ocs102	130.97.238.62	TBD	X-Terminal to PCS
OCS103	ocs103	130.97.238.63	TBD	X-Terminal to PCS
OCS105	ocs105	130.97.238.65	TBD	X-Terminal to PCS
OCS107	ocs107	130.97.238.67		
WRAP1X2	wrap1x2	130.97.238.66		
NY106	ny106	130.97.238.90	10001	RF Bar Code Term1, NT-101
			10002	RF Bar Code Term2, NT-103
			10003	RF Bar Code Term3, NT-300
			10004	RF Bar Code Term4, NT-303
			10005	RF Bar Code Term5, NT-310
			10006	RF Bar Code Term6, NT-313
ROUTER	WRAP1_Router	130.97.238.120		Ethernet Port 0
Shiva Netmodem		130.97.238.110		
ISDN Modem		130.97.238.109		
SII PC		130.97.238.162 130.97.238.163		
IBM 760EL WC59692		130.97.238.164		
Micron WC57738		130.97.238.165		
IBM 760ELD WC58097		130.97.238.166		
PC WC61695		130.97.238.167		
IBM 760ELD WC58099		130.97.238.168		
Wrappms		130.97.204.56		
End of Table				

8.9.3 Network Port and Addressing Implementation Notes

Where possible, all socket connections will be based on the client-server philosophy and use ephemeral (dynamically allocated) ports in the range of 1024 to 4999. The "server" will have a fixed TCP port number with the "client" initiating communications with the server and transmitting it's ephemeral port number during the initial message transmission.

If a host has more than one communication process running, additional TCP port numbers may be assigned (incrementing the last digit of the TCP Port Number). Note that the DMS will be running a Time Service at TCP port number 37.

8.10 INITIALIZATION OF NETWORK

The DMS system will make a stream socket connection to the PCS system on the specified TCP port and wait for through either a null message or a status request message. This connection is used for all messages to and from the DMS. The subsystem should not close the connection until the software terminates.

Similarly, the AGV, AS/RS, PAM, GEA_A, PAN_A, GEA_B, PAN_B and SIE systems will also listen on the specified TCP ports for the PCS to make a stream socket connection through a status request message. Here, the PCS is the Client and the AGV, AS/RS, PAM, GEA, PAN, and SIE systems are Servers. All of these connections should not close until the software terminates.

Once the PCS is started, it will attempt to connect to each of the subsystems (AGV, AS/RS, PAM, GEA_A, PAN_A, GEA_B, and PAN_B). Any connection attempt that fails will be repeated at 1 minute intervals.

Once the PCS has successfully connected to another subsystem, it will process and respond to messages received from the subsystem, even if all subsystems are not connected. However, the PCS will respond to the DMS with error messages on actions that require communications with an unconnected subsystem.

8.11 RECOVERY AND TROUBLESHOOTING NETWORK ERRORS

8.11.1 TCP general Error Detection and Retransmission

TCP delivers data units called segments from a source TCP port to a destination TCP port. The application layer processes employing TCP are not aware of the segment structure of the data and perceive a continuous stream. TCP provides detection and recovery from loss, duplication, corruption, and misordering of IP datagrams that might occur in lower-level (OSI) layers. It employs send sequence numbers and an acknowledgement mechanism to ensure that all segments are delivered without errors and in the proper sequence. TCP also employs a retransmission timer to detect lost segments that are caused by errors occurring in lower layers. When a segment is sent, the TCP process in the sending host starts the retransmission timer. If the timer expires before that segment is acknowledged, the sender retransmits the segment. Since TCP transmission is full duplex, each TCP user keeps track of sequence numbers for data it is sending and for data it has received. TCP also uses checksums for error detection. A checksum value is calculated and included in each segment that is sent. When a segment is received, the recipient calculates the same checksum. If the calculated checksum values does not agree with the one sent with the segment, the segment is discarded. Since the erroneous segment is not acknowledged, the sender eventually times out and retransmits the segment. Additionally, flow and congestion control mechanisms exist within TCP.

8.11.2 Subsystem Response to Lost Connections

If the AGV, PAM, AS/RS, GEA_A, PAN_A, GEA_B, or PAN_B systems detect a lost connection to the PCS host system, they will return to the state of listening on the specified TCP port until the PCS re-establishes a connection through a status command within a minute.

If the PCS detects a lost connection with the DMS, it will also return to a state of listening on the specified TCP port for a status request message from the DMS. Additionally, as soon as the PCS or DMS detect a lost connection with a subsystem, it will attempt to reconnection with status request messages at one minute intervals until successful. Appropriate error status messages and historical logs will be displayed at each systems consoles during these occurrences.

8.11.3 Network Troubleshooting Tools

The "ifconfig", "ping", "traceroute", "arp", and "netstat" commands will be used for checking network interface cards, informing if remote hosts are reachable, tracing packet routes, checking IP addressing information, and displaying network statistics.

Additionally, the communication program running on the PCS will have the ability to create an ASCII network trace file with startup switches. This file would become a historical log of all network commands received and transmitted to the AGV, AS/RS,. PAM, GEA_A, PAN_A, GEA_B, PAN_B, SIE, and DMS systems.

SNMP network management software tools could also be employed to manage and locate problems of all types in the WLAN. Details are available in the SNMP user's guides.

Lastly, network management software for the CABLETRON Hub / Router to display, monitor, and troubleshoot the network is available and may be purchased by the buyer.

8.12 REFERENCES

1 SUN Microsystems, 1987, *XDR Protocol*, RFC 1014, SRI International, DDN Network Information Center, Menlo Park, California.

2 IEEE 802, 1983-1986, *Local Area Network*, Publication Service, Institute of Electrical and Electronics Engineers.

3 Postel, J., 1981, *Internet Protocol*, RFC 791, SRI International, DDN Network Information Center, Menlo Park, California.

4 Postel, J., 1981, *TCP Protocol*, RFC 793, SRI International, DDN Network Information Center, Menlo Park, California.

5 Postel, J., 1981, *ICMP Protocol*, RFC 792, SRI International, DDN Network Information Center, Menlo Park, California.

Table of Contents

List of Tables

9.0 SERCOM SYSTEM

9.1 OVERVIEW

SERCOM is a group of C language programs that allow WRAP Programmable Logic Controllers (PLCs) to communicate with remote devices, such as lift tables, weight transmitters, and sorting tables, via a serial link. The SERCOM programs run on the PLC control coprocessors in the Local Control Units (LCUs).

The Application Program Interface (API) is a set of library routines used to interface the programs with the control coprocessor. The Data Table Library (DTL) routines are used to access real time data from the data table of a direct-connect programmable controller. Data is transferred between the control coprocessor and the PLC-5 processor via the connector interface between the two devices. The SERCOM programs are compiled on a personal Computer (PC) then the binary files are transferred to control coprocessor.

9.2 SERCOM EQUIPMENT

There are two different SERCOM programs. SERCOM1 runs in LCUs 101, 102, and 103. SERCOM2 runs in LCU 104 only. SERCOM1 is made up of the files SERDEFS1.H, DTL1.C, GENDTL1.C, GENSER1.C, POLLER1.C, SERCOM1.C, SERR1.C, SERW1.C and TRACE.C. The program SERCOM2 is made up of the files SERDEFS2.H, DTL2.C, GENDTL2.C, POLLER2.C, SERCOM2.C, SERR2.C, SERW2.C, and TC2.C. Each program is compiled into binary files, which are loaded into the co-processor. SERCOM1's function is to control the serial devices of weight transmitters, lift tables, and sorting tables. SERCOM2's function is to pass all information between LCU104 and the HVAC distributed control system (DCS) by Andover Controls. Each LCU has a program called STARTUP loaded in the co-processor, which starts the SERCOM programs on power-up or on a reset.

In the LCUs, SERCOM interfaces with the following serial communications devices as shown in Table 9-1.

Table 9-1. Equipment Interface

Equipment ID	Description	LCU
WIT-107	Drum Scale A Weight Transmitter	LCU 1
WIT-110	Drum Scale B Weight Transmitter	LCU 1
WIT-219	Box Scale Conveyor Weight Transmitter	LCU 1
CV-09-201A	Drum Transfer A Weight Transmitter (Airlock)	LCU 2
CV-09-201B	Drum Transfer B Weight Transmitter (Airlock)	LCU 2
LT-09-202A	LLW Entry Lift Table	LCU 2
LT-09-203A	LLW RWM Transfer Lift Table	LCU 2
LT-09-202C	LLW Exit Lift Table	LCU 2
LT-09-201D	LLW RWM Non-Compliant Exit Lift Table	LCU 2
LT-09-201E	LLW RWM Compliant Exit Lift Table	LCU 2
LT-09-201F	LLW RWM Entry Lift Table	LCU 2
	TRU Sort Table Servo Motor Controller	LCU 3
LT-09-202B	TRU Entry Lift Table	LCU 3
LT-09-203B	TRU RWM Transfer Drum Lift Table	LCU 3
LT-09-203C	TRU Empty Drum Loadout Lift Table	LCU 3
LT-09-202D	TRU Waste Loadout Lift Table	LCU 3
LT-09-202E	TRU Waste Loadout Lift Table	LCU 3
LT-09-201A	TRU RWM Non-Compliant Exit Lift Table	LCU 3
LT-09-201B	TRU RWM Compliant Exit Lift Table	LCU 3
LT-09-201C	TRU RWM Entry Lift Table	LCU 3
	HVAC DCS Controller	LCU4

9.3 CONFIGURATION FILES

The PLC coprocessors also have configuration files loaded in them for each type of devices they have to deal with. Each coprocessor also has a COMMPORT.CFG file to configure the communications ports on the LCUs. The file FBS.CFG is configuration information for the Fairbanks Scales, CMS.CFG is for the Compumotor servo controllers, and CMXDRO.CFG and CMXDRW.CFG are for the HVAC DCS in LCU-104. Communications port 0 on each coprocessor is for connecting the lap top computer to for communications, communications port 1 is used for Fairbanks scales, communications port 2 is used for Compumotor servo controllers, and communications port 3 is not used. LCU104 does not require any communications port configuration. It is handled within the SERCOM2 program. Table 9-2 lists how the communications ports are configured for each LCU.

Table 9-2. Port Assignments For LCUs (COMMPORT.CFG)

LCU	Portname	enable	Devtype	Baud	parity	Comments
101	comm0	00	00	00	00	Lap top
	comm1	01	01	0E	00	Fairbanks Scales
	comm2	00	00	00	00	Not used
	comm3	00	00	00	00	Not used
102	comm0	00	00	00	00	Lap top
	comm1	01	02	0E	00	Fairbanks Scales
	comm2	01	01	0E	00	Compumotor Servo Controller
	comm3	00	00	00	00	Not used
103	comm0	00	00	00	00	Lap top
	comm1	01	02	0E	00	Fairbanks Scales
	comm2	01	01	0E	00	Compumotor Servo Controller
	comm3	00	00	00	00	Not used
104	comm0	N/A	N/A	N/A	N/A	Lap top
	comm1	N/A	N/A	N/A	N/A	CMX

9.3.1 Fairbanks Weight Scales Configuration File (FBS.CFG)

The Fairbanks configuration file contains the information for port number and termination character. For LCU101 the port number is 1 and the termination character is 0D. For LCU102 the port number is 2 and the termination character is 0D. LCU103 and LCU104 have no Fairbanks scales. All other information is as shown in Table 9-3.

Table 9-3. Weight Scale Configuration File (FBS.CFG)

Tagname	Dropid	cycle	Mult	nfilenum	Address	LCU	Comments
Tagname01	10	10000	01	104	00	101	WIT-107
Tagname02	11	9000	01	115	00	101	WIT-110
BOX_SCALE	12	8000	01	254	00	101	WIT-219
Tagname01	13	13	01	30	10	102	CV-09-201A
Tagname02	14	14	01	30	16	102	CV-09-201B

Listed in Table 9-4 is the memory region in the LCU for the lift table control information. The ***nfilenum*** is the data file number in the LCU. Under the status, integer value, and decimal value columns are the words within the data file that contain the information.

Table 9-4. PLC Memory Map For Weight Scales

Scale	Nfilenum	Status	Integer value	decimal value
WIT-107	104	00	01	02
WIT-110	115	00	01	02
WIT-219	254	00	01	02
WIT-09-201A	30	10	11	12
WIT-09-201B	30	16	11	12

9.3.2 Compumotor Servo Controller Configuration File (CMS.CFG)

Only LCUs 102 and 103 have Compumotor Servo Controller to configure. For LCU102 the port number is 1 and the termination character is 0D. For LCU103 the port number is 1 and the termination character is 0D. The program file in the LCU for 102 is 31 and in 103 is 32. The configuration information is in Table 9-5.

Table 9-5. Lift Table Configuration File (CMS.CFG)

Tagname	Dropid	Cycle	nfilenum	Address	LCU	Comments
Tagname01	04	10	314	06	102	LT-09-201D
Tagname02	05	10	314	12	102	LT-09-201E
Tagname03	06	10	314	18	102	LT-09-201F
Tagname04	07	10	314	24	102	LT-09-202A
Tagname05	08	10	314	36	102	LT-09-203A
Tagname06	09	10	314	30	102	LT-09-202C
Tagname01	01	05	324	08	103	LT-09-201A
Tagname02	02	05	324	14	103	LT-09-201B
Tagname03	03	05	324	20	103	LT-09-201C
Tagname04	04	05	324	26	103	LT-09-202B
Tagname05	05	05	324	50	103	LT-09-203C
Tagname06	06	05	324	44	103	LT-09-203B
Tagname07	07	05	324	32	103	LT-09-202D
Tagname08	08	05	324	38	103	LT-09-202E

Table 9-6 is the memory region in the PLC for the lift table control information. The nfilenum is the data file number in the LCU. Under the other columns are the words within the data file that contain the information.

Table 9-6. PLC Memory Map For Lift Tables

Lift Table	Nfilenum	Write Status	Copro Index	Servo Response	Read Status	PLC Index	PLC Command
LLW LIFT TABLES							
LT-09-201D	314	06	07	08	09	10	11
LT-09-201E	314	12	13	14	15	16	17
LT-09-201F	314	18	19	20	21	22	23
LT-09-202A	314	24	25	26	27	28	29
LT-09-203A	314	36	37	38	39	40	41
LT-09-202C	314	30	31	32	33	34	35
TRU LIFT TABLES							
LT-09-201A	324	08	09	10	11	12	13
LT-09-201B	324	14	15	16	17	18	19
LT-09-201C	324	20	21	22	23	24	25
LT-09-202B	324	26	27	28	29	30	31
LT-09-203C	324	50	51	52	53	54	55
LT-09-203B	324	44	45	46	47	48	49
LT-09-202D	324	32	33	34	35	36	37
LT-09-202E	324	38	39	40	41	42	43

9.4 SERVO MOTOR INTERFACE

Servomotors are used to raise and lower lift tables and to move the TRU Sorting Table (107-ST-07-301). The SERCOM Servo Motor Interface to support lift table operation is programmed in LCU102 program file 31 and LCU103 program file 32. The SERCOM Servo Motor Interface to support TRU Sorting table operation is programmed in LCU103 program files 51 and 54. Each program file has an associated data file. The associated data files provide a command register, a command index, and a response register for each servomotor.

Servo motor sequences are initiated when the PLC places a non-zero value in a command register and increments the command index. SERCOM continuously monitors the value of each command register. When SERCOM detects a non-zero value in a command register, it issues a servo motor command corresponding to the value placed in the register.

For example, to initiate sequence #5 for lift table 107-LT-090201A, the PLC increments the lift table 201A command index and places a value of "5" in the lift table command register. SERCOM reads the command register value and decodes this value. SERCOM then issues a command to lift table 201A to execute sequence #5.

Command indexes are used to track when a sequence is requested and when it is completed. Each PLC command index has a counterpart SERCOM command index. Typically, both indexes have identical values. When a PLC requests a servo motor sequence, it increments the PLC command index, causing the PLC and SERCOM indexes to differ in value. After SERCOM transmits a servomotor command, it increments the SERCOM command index, causing the PLC and SERCOM indexes to again match in value. When the values in the two indexes are equal, the command index is updated to equal 0.

Servo motor response registers indicate when certain servo motor sequences are complete. The programming for such sequences includes a response code. Each response code consists of the servo motor address (An integer value, 1-9), followed by a comma, followed by the number of the servo motor sequence completed. When the servomotor completes the requested sequence, it transmits the response code to SERCOM. SERCOM decodes the response code and places the sequence number in the response register. Table 9-7 lists the applicable servo motor command sequences and responses.

Table 9-7. Servo Motor Interface

Commands	Programmed Sequence #	Comments
Goto "Drum Centering Position" at Norm Speed	<a>XR1	
Goto "Lid in Position" at Slow Speed	<a>XR2	
Goto "Door in Position" at Slow speed	<a>XR3	
Goto "Drum Centering Position" at Slow Speed	<a>XR4	
Goto "AGV Height" at Normal Speed	<a>XR5	
Goto "Glovebox Height" at Normal Speed	<a>XR6	
"Lower at Normal Speed"	<a>XR7	
"Raise at Normal Speed"	<a>XR8	
"Lower at Slow Speed"	<a>XR9	
"Raise at Slow Speed"	<a>XR10	
"Stop"	<a>XR11	
"Raise to Bagless Transfer Port"	<a>XR12	Raise fast just before position then slow
Goto "Lowered Position" at Normal Speed	<a>XR13	
Goto "Home Position" at Normal Speed	<a>XR14	Initiated Upon receiving a power failure
Status Messages	**Quote Message**	**Comments**
At "Drum Centering Position"	"xx 01"/"xx04'	Sent after XR1 & XR4
At "Lid in Position"	"xx 02"	Sent after XR2
At "Door in Position"	"xx 03"	Sent after XR3
At "AGV Height" position	"xx 05"	Sent after XR5, if necessary
At "Glovebox Height" position	"xx 06"	Sent after XR6, if necessary
"Moving Down at Normal Speed"	"xx 07"	Sent after XR7
"Moving Up at Normal Speed"	"xx 08"	Sent after XR8
"Moving Down at Slow Speed"	"xx 09"	Sent after XR9
"Moving Up at Slow Speed"	"xx 10"	Sent afterXR10
"Moving to Bagless Transfer Port"	"xx 12"	Sent after XR12
At "Lowered Position"	"xx 13"	Sent after XR13
At "Home Position"	"xx 14"	Sent after XR14
Trouble	"xx 99"	Set XFK to an XR which will call Quote

Notes:

<a> corresponds to the address of the servo motor (i.e. a valid command would be "7XR1")

xx corresponds to the address of the servomotor embedded into the status message (i.e. "01 01"). The first two digits are always the address with a possible zero prefix.

9.5 COMMUNICATION SETUP AND ADDRESSING

All servo motor controllers should be configured for RS-232 communications, 9600 baud, 8 data, No Parity, 1 Stop Bit. RS232 to RS485 converters may be used to allow communication cable runs in excess of 15 meters (50 feet). Table 9-8 lists the servo motor addresses.

Table 9-8. Servo Motor Addresses

Description	Tag Number	Address
LLW Entry	107-LT-09-202A	04
LLW Sorting (RWM Transfer)	107-LT-09-203A	05
LLW Exit	107-LT-09-202C	06
LLW RWM Exit (Port 203)	107-LT-09-201D	01
LLW RWM Exit (Port 202)	107-LT-09-201E	02
LLW RWM Transfer	107-LT-09-201F	03
TRU Empty Compacts	107-LT-09-203C	05
TRU Entry	107-LT-09-202B	04
TRU Sorting (RWM Transfer)	107-LT-09-203B	06
TRU Sorting Table	107-ST-07-302	09
TRU Exit (Port 309)	107-LT-09-202D	07
TRU Exit (Port 310)	107-LT-09-202E	08
TRU RWM Exit (Port 402B)	107-LT-09-201A	01
TRU RWM Exit (Port 402A)	107-LT-09-201B	02
TRU RWM Transfer	107-LT-09-201C	03

9.5.1 Weight Transmitters

Weight transmitters communicate via two different protocols. Typically, scales that require high accuracy readings communicate to a PLC via an RS-232/RS-485 serial link. Typically, multiple transmitters are attached to a single serial communications loop. Therefore, a unique address is required for each transmitter. SERCOM polls each transmitter and each polling command is prefixed by the transmitter address. All serial link weight transmitters should be configured for RS-485 communications, 9600 baud, 8 data bits, no parity, 1 stop bit.

Other weight transmitters, typically those used for process control, transmit weight to a PLC using a 4-20 mA current loop. These transmitters do not communicate with SERCOM and do not require a unique address. Table 9-9 lists the WRAP weight transmitters.

Table 9-9. Weight Transmitters

Description	Tag Number	Transmitter Address	Comments
CV-05-103A Drum Scale/Conveyor	107	10	
CV-05-103B Drum Scale/Conveyor	110	11	
CV-09-105 Box Conveyor/Scale	219	12	
CV-09-201A Drum Transfer Conveyor	215	13	
CV-09-201B Drum Transfer Conveyor	216	14	
LT-09-201F Lift Table	231	Not Applicable	LLW
LT-09-203A Lift Table	241	Not Applicable	LLW
Exit Glovebox Trolley Puck Weight	107-DH-07-104	Not Applicable	LLW
LT-09-201A Lift Table	221	Not Applicable	TRU
LT-09-201B Lift Table	223	Not Applicable	TRU
LT-09-201C Lift Table	225	Not Applicable	TRU
LT-09-202D Lift Table	239	Not Applicable	TRU
LT-09-203B Lift Table	243	Not Applicable	TRU
LT-09-203C Lift Table	245	Not Applicable	TRU
LT-09-202E Lift Table	247	Not Applicable	TRU

9.6 HVAC SERCOM2

SERCOM2 run in LCU104. SERCOM2 is used to return or put the following values into the following data files locations in LCU104. Puts are only done for analog outputs. To see which are inputs and outputs see HVAC System section of this document. The tagnames listed in Table 9-10 are not the same as tags in the field or on the drawings. These are the tagnames as defined in the HVAC DCS system by Andover Systems.

Table 9-10. HVAC Tagnames

Tagname	Nfilenum	Word
H11.FI.617A.SP	630	0
H11.TI.609A.SP	630	0
H11.MI.632A.SP	630	0
H11.FI.603A.SP	630	2
H11.FI.618B.SP	630	2
H11.TI.632A.SP	630	2
H11.FI.618A.SP	630	4
H11.TI.627.SP	630	4
H11.TI.668.SP	630	4
H11.TI.609B.SP	630	6
H11.MI.632B.SP	630	6
H11.FI.617B.SP	630	8
H11.FI.603B.SP	630	8
H11.TI.632B.SP	630	8
FT.11.201A.SP	630	16
FT.11.201A.ST	630	24
FT.11.201B.SP	630	32
FT.11.201B.ST	630	40
H11.FI.314	630	56
H11.FI.316	630	60
H11.FI.371	630	64
H11.FI.391	630	68
H11.FI.617A	630	72
H11.FI.617B	630	76
H11.PDI.315	630	80
H11.PDI.317	630	84
H11.PDI.372	630	88
H11.PDI.392	630	92
H11.PDI.611A	630	96
H11.PDI.611B	630	100
H11.PDISH.611A	630	104
H11.PDISH.611B	630	108
H11.PDISH.613A	630	112
H11.PDISH.613B	630	116
H11.PDISH.615A	630	120
H11.PDISH.615B	630	124
H11.PDISL.617A	630	128
H11.PDISL.617B	630	132

Table 9-10. HVAC Tagnames

Tagname	Nfilenum	Word
EF.11.201A.S	630	136
EF.11.201B.S	630	140
AH.11.201A.ST	630	200
AH.11.201A.SP	630	208
AH.11.201B.ST	630	216
AH.11.201B.SP	630	224
FT.11.202A.ST	630	232
FT.11.202A.SP	630	240
FT.11.202B.ST	630	248
FT.11.202B.SP	630	256
H11.TI.601A	630	280
H11.TI.605A	630	284
H11.FI.603A	630	288
H11.TI.609A	630	292
H11.TI.601B	630	296
H11.TI.605B	630	300
H11.FI.603B	630	304
H11.TI.609B	630	308
H11.TI.618A	630	312
H11.FI.618A	630	316
H11.TI.618B	630	320
H11.FI.618B	630	324
H11.PDISH.601A	630	328
H11.PDISH.602A	630	332
H11.PDISL.603A	630	336
AH.11.201A.S	630	340
H11.PDISH.601B	630	344
H11.PDISH.602B	630	348
H11.PDISL.603B	630	352
AH.11.201B.S	630	356
H11.PDISH.612A	630	360
H11.PDISH.614A	630	364
H11.PDISH.616A	630	368
H11.PDISL.618A	630	372
FT.11.202A.S	630	376
H11.PDISH.612B	630	380
H11.PDISH.614B	630	384
H11.PDISH.616B	630	388

Table 9-10. HVAC Tagnames

Tagname	Nfilenum	Word
H11.PDISL.618B	630	392
FT.11.202B.S	630	396
H11.ZSO.608	630	400
H11.ZSC.608	630	404
AH.11.101.ST	630	432
AH.11.101.SP	630	440
AH.11.101.OC	630	448
AH.11.101.UC	630	456
H11.TI.621	630	472
H11.TI.626	630	476
H11.TI.627	630	480
H11.PDISL.624	630	484
H11.PDISH.621	630	488
H11.PDISH.622	630	492
H11.PDISL.623	630	496
SF.11.101.S	630	500
RF.11.101.S	630	504
AH.11.501A.ST	630	544
AH.11.501A.SP	630	552
AH.11.501B.ST	630	560
AH.11.501B.SP	630	568
H11.TI.635A	630	584
H11.TI.637A	630	588
H11.MI.632A	630	592
H11.TI.632A	630	596
H11.TI.635B	630	600
H11.TI.637B	630	604
H11.MI.632B	630	608
H11.TI.632B	630	612
H11.PDISL.633A	630	616
H11.PDISH.631A	630	620
H11.PDISH.632A	630	624
SF.11.501A.S	630	628
H11.PDISL.633B	630	632
H11.PDISH.631B	630	636
H11.PDISH.632B	630	640
SF.11.501B.S	630	644
AH.11.401.ST	630	652
AH.11.401.SP	630	660
AH.11.401.OC	630	668
AH.11.401.UC	630	676
H11.TI.641	630	692
H11.TI.642	630	696
H11.TI.645	630	700
H11.FI.643	630	704
H11.PDI.645	630	708
H11.FI.642	630	712
H11.PDISL.644	630	716

Table 9-10. HVAC Tagnames

Tagname	Nfilenum	Word
H11.PDISH.641	630	720
H11.PDISH.642	630	724
H11.PDISL.643	630	728
SF.11.401.S	630	732
RF.11.401.S	630	736
AH.11.301.ST	630	752
AH.11.301.SP	630	760
AH.11.301.OC	630	768
AH.11.301.UC	630	776
H11.TI.665	630	792
H11.TI.668	630	796
H11.PDISH.661	630	800
H11.PDISH.662	630	804
H11.PDISL.663	630	808
EF.11.301.S	630	812
AH.11.301.S	630	816
P.11.101A.ST	630	828
P.11.101A.SP	630	836
P.11.101B.ST	630	844
P.11.101B.SP	630	852
P.11.102A.ST	630	860
P.11.102A.SP	630	868
P.11.102B.ST	630	876
P.11.102B.SP	630	884
H11.FI.652	630	896
P.11.101A.S	630	900
P.11.101B.S	630	904
P.11.102A.S	630	908
P.11.102B.S	630	912

Table of Contents

List of Tables

List of Figures

10.0 HVAC SYSTEM

10.1 OVERVIEW

The process exhaust Heating, Ventilation, and Air Conditioning (HVAC) area is located adjacent to the process area and contains the exhaust fans and High Efficiency Particulate Air (HEPA) filtration equipment associated with the process area. Two emergency personnel exits through airlocks are provided directly to the outside.

The process exhaust HVAC area contains two Zone I and two Zone II ventilation exhaust systems. These exhaust systems provide the ventilation confinement zones for the process enclosures and the process areas, ensuring any airborne contamination flows from less contaminated to more contaminated areas. Each exhaust system consists of plenums, two stages of HEPA filtration, exhaust fans and associated valves, instruments, and controls.

An elevated exhaust stack is provided to disperse filtered exhaust air into the atmosphere and to provide for continuous sampling and monitoring of emissions. The Waste Receiving and Processing (WRAP) stack is located adjacent to the Western Wall of the building, toward the north side. The stack location and height take into consideration the prevailing winds and wind effects, including building effects on the airflow. The stack is designed to prevent intake of the exhaust by WRAP and adjacent facilities. The stack also has ample clearance from other structures that could restrict airflow or cause recirculation of exhausted air. The stack sumps are designed so that routine draining, maintenance, and other operations can be performed without entering the stack.

The HVAC system is controlled by it's own Distributed Control System (DCS) by Andover Controls. This DCS system interfaces with the Plant Control System (PCS). The PCS provides monitoring of the system, alarm management, set point adjustments and historical record keeping. The HVAC DCS is connected to the PCS with a single RS-232 communications link.

10.2 HVAC EQUIPMENT

Local Control Unit (LCU) 104 contains all the HVAC signals. The HVAC DCS cabinets collect the data from the field devices. In file 5 of LCU104 there are Block Transfer Read and Block Transfer Write functions that collect the data from the HVAC DCS and copy it into data registers in the LCU. LCU 104 has direct communications with and control over device 11-NC-100. The programmable logic controller (PLC) utilizes a communications co-processor to directly communicate with the devices. The data is passed to the co-processor, which assembles the messages necessary to communicate with the device. Status messages from the devices are decoded into data, which is passed on to the PLC. The PLC will then pass on any relevant information to the database. This is for the purpose of interfacing with the real time applications platform (RTAP) software. Listed in Table 10-1 Process Zone I through Table 10-7 are the

valid HVAC equipment items within the WRAP 1 facility, separated by building area. In addition, the PLC register address associated with each item is listed.

In LCU 104, file 63, are all the trouble alarms for the air handling unit controllers. Each controller is monitored and if trouble persists for great then 60 seconds, an alarm is sounded on RTAP. Also in file 63, if one of the Alpha or Beta Continuous Air Monitors (CAMs) in either the Shipping/Receiving area or the NDE/NDA area becomes active, the HVAC system is shut down.

Table 10-1 Process Zone I

Tag	Description	Type Of Sig.	PLC Register
HVAC DCS To PCS Via Communication Link			
11-PDI-392	LLWRWM Glovebox Differential Pressure	Integer	N630:92
11-PDI-372	TRURWM Glovebox Differential Pressure	Integer	N630:88
11-PDI-317	LLW Glovebox Differential Pressure	Integer	N630:84
11-PDI-315	TRU Glovebox Differential Pressure	Integer	N630:80
11-FI-391	LLWRWM Glovebox Airflow	Integer	N630:68
11-FI-371	TRURWM Glovebox Airflow	Integer	N630:64
11-FI-316	LLW Glovebox Airflow	Integer	N630:60
11-FI-314	TRU Glovebox Airflow	Integer	N630:56
11-PDI-611A	FT-11-201A Differential Pressure	Integer	N630:96
11-PDISH-611A	FT-11-201A Prefilter Dirty	Binary	N630:104
11-PDISH-613A	FT-11-201A HEPA 1 Dirty	Binary	N630:112
11-PDISH-615A	FT-11-201A HEPA 2 Dirty	Binary	N630:120
11-PDISL-617A	FT-11-201A Exhaust Fan Run	Binary	N630:128
11-FI-617A	EF-11-201A Exhaust Filter Train Flow	Integer	N630:72
11-FI-617A-SP	EF-11-201A Exhaust Filter Train Flow	Integer	N630:0
11-PDI-611B	FT-11-201B Differential Pressure	Integer	N630:100
11-PDISH-611B	FT-11-201B Prefilter Dirty	Binary	N630:108
11-PDISH-613B	FT-11-201B HEPA 1 Dirty	Binary	N630:116
11-PDISH-615B	FT-11-201B HEPA 2 Dirty	Binary	N630:124
11-PDISL-617B	FT-11-201B Exhaust Fan Run	Binary	N630:132
11-FI-617B	EF-11-201B Exhaust Filter Train	Integer	N630:76
11-FI-617B-SP	IF-11-201B Exhaust Filter Train	Integer	N630:8
PCS To HVAC DCS Via Communication Link			
FT-11-201A-ST	EF-11-201A Exhaust Filter Train	Binary	N630:24
FT-11-201A-SP	EF-11-201A Exhaust Filter Train	Binary	N630:16
11-FI-617A-SP	EF-11-201A Exhaust Filter Train	Integer	N630:0
FT-11-201B-ST	EF-11-201B Exhaust Filter Train	Binary	N630:40
FT-11-201B-SP	EF-11-201B Exhaust Filter Train	Binary	N630:32
11-FI-617B-SP	EF-11-201B Exhaust Filter Train	Integer	N630:8
Hardwired To PCS			
11-XA-611A	C-11-201A Filter Train Trouble Alarm	Digital	I:010/12
11-XA-611B	C-11-201B Filter Train Trouble Alarm	Digital	I:010/13
End of Table			

Table 10-2 Process Zone II

Tag	Description	Type Of Sig.	PLC Register
HVAC DCS To PCS Via Communication Link			
11-PDISH-601A	AH-11-201A, Pre Filter Dirty	Binary	N630:328
11-PDISH-602A	AH-11-201A, Final Filter Dirty	Binary	N630:332
11-TI-601A	AHU A, Outside Air Temperature	Analog	N630:280
11-TI-605A	AH-11-201A, Supply Air Temperature	Integer	N630:284
11-PDISL-603A	SF-11-201A, Supply Fan Not Running	Binary	N630:336
11-FI-603A	AH-11-201A, Supply Air Flow	Integer	N630:288
11-FI-603A-SP	AH-11-201A, Supply Air Flow Set Point	Integer	N630:152
11-TI-609A	AH-11-201A, Process Area Humidity	Integer	N630:292
11-TI-609A-SP	AH-11-201A, Process Area Humidity Set Point	Integer	N630:160
AH-11-201A-S	Process Area AHU A Running	Binary	N630:136
11-PDISH-601B	AH-11-201B, Pre Filter Dirty	Binary	N630:344
11-PDISH-602B	AH-11-201B, Final Filter Dirty	Binary	N630:348
11-TI-601B	AHU B, Outside Air Temperature	Analog	N630:296
11-TI-605B	AH-11-201B, Supply Air Temperature	Integer	N630:300
11-PDISL-603B	SF-11-201B, Supply Fan Not Running	Binary	N630:352
11-FI-603B	AH-11-201B, Supply Air Flow	Integer	N630:304
11-FI-603B-PS	AH-11-201B, Current Supply Air Flow Set Point	Integer	N630:168
11-TI-609B	AH-11-201B, Process Area Temperature	Integer	N630:308
11-TI-609B-SP	AH-11-201B, Process Area Temperature Set Point	Integer	N630:176
AH-11-201B-S	AH-11-201B, Process Area AHU B Running	Binary	N630:140
11-PDISH-612A	FT-11-202A, Pre Filter Dirty	Binary	N630:360
11-PDISH-614A	FT-11-202A, First HEPA Filter Dirty	Binary	N630:364
11-PDISH-616A	FT-11-202A, Second HEPA Filter Dirty	Binary	N630:364
11-TI-618A	FT-11-202A, Exhaust Air Temperature	Integer	N630:312
11-PDISL-618A	EF-11-202A, Exhaust Fan Not Running	Binary	N630:372
11-FI-618A	EF-11-202A, Exhaust Air Flow	Integer	N630:316
11-FI-618A-SP	EF-11-202A, Current Exhaust Air Flow Set Point	Integer	N630:184
FT-11-202A-S	EF-11-202A, Exhaust Fan Running	Binary	N630:376
11-PDISH-612B	FT-11-202B, Pre Filter Dirty	Binary	N630:380
11-PDISH-614B	FT-11-202B, First HEPA Filter Dirty	Binary	N630:384
11-PDISH-616B	FT-11-202B, Second HEPA Filter Dirty	Binary	N630:388
11-TI-618B	FT-11-202B, Exhaust Air Temperature	Integer	N630:320
11-PDISL-618B	EF-11-202B, Exhaust Fan Not Running	Binary	N630:392
11-FI-618B	EF-11-202B, Exhaust Air Flow	Integer	N630:324
11-FI-618B-SP	EF-11-202B, Current Exhaust Air Flow Set Point	Integer	N630:192
FT-11-202B-S	EF-11-202B, Exhaust Fan Running	Binary	N630:396
11-ZSO-608	Zone II Exhaust Fire Damper Open	Binary	N630:400
11-ZSC-608	Zone II Exhaust Fire Damper Closed	Binary	N630:404
PCS To HVAC DCS Via Communication Link			
AH-11-201A-ST	AH-11-201A, Process Area AHU Start Pulse	Binary	N630:200
AH-11-201A-SP	AH-11-201A, Process Area AHU Stop Pulse	Binary	N630:208
11-FI-603A-SP	AH-11-201A, Supply Air Flow Set Point	Integer	N630:152
11-TI-609A-SP	AH-11-201A, Process Area Temperature Set Point	Integer	N630:160
AH-11-201B-ST	AH-11-201B, Process Area AHU Start Pulse	Binary	N630:216
AH-11-201B-SP	AH-11-201B, Process Area AHU B Stop Pulse	Binary	N630:224
11-FI-603B-SP	AH-11-201B, Supply Air Flow Set Point	Integer	N630:168

Table 10-2 Process Zone II

Tag	Description	Type Of Sig.	PLC Register
11-TI-609B-SP	AH-11-201B, Process Area Temperature Set Point	Integer	N630:176
FT-11-202A-ST	FT-11-202A, Exhaust Filter Train Start Pulse	Binary	N630:232
FT-11-202A-SP	FT-11-202A, Exhaust Filter Train Stop Pulse	Binary	N630:240
11-FI-618A-SP	EF-202A, Exhaust Air Flow Set Point	Integer	N630:184
FT-11-202B-ST	FT-202B, Exhaust Filter Train Start Pulse	Binary	N630:248
FT-11-202B-SP	FT-202B, Exhaust Filter Train Stop Pulse	Binary	N630:256
11-FI-618B-SP	FE-202B, Exhaust Air Flow Set Point	Integer	N630:192
Hardwired To PCS			
11-XA-601A	C-11-201A, Area 3 AHU Controller Trouble Alarm	Digital	I:010/16
11-XA-601B	C-11-201A, Area 3 AHU Controller Trouble Alarm	Digital	I:011/00
11-ZSO-604	Common Supply Air Damper Open	Digital	I:011/02
11-ZSC-604	Common Supply Air Damper Closed	Digital	I:011/01
11-XA-612A	C-11-202A, Exhaust Filter Controller Trouble Alarm	Digital	I:010/14
11-XA-612B	C-11-202B, Exhaust Filter Controller Trouble Alarm	Digital	I:010/15
End of Table			

Table 10-3. Shipping/Receiving and NDE/NDA HVAC

Tag	Description	Type Of Sig.	PLC Register
HVAC DCS To PCS Via Communication Link			
11-PDISL-624	RF-11-101, Return Fan Not Running	Binary	N630:484
11-TI-621	AH-11-101, Mixed Air Temperature	Integer	N630:472
11-PDISH-621	AH-11-101, Pre Filter Dirty	Binary	N630:488
11-PDISH-622	AH-11-101, Final Filter Dirty	Binary	N630:492
11-PDISL-623	SF-11-101, Supply Fan Not Running	Binary	N630:496
11-TI-626	AH-11-101, Supply Air Temperature	Integer	N630:626
11-TI-627	AH-11-101, NDE/NDA Area Temperature	Integer	N630:480
SF-11-101-S	SF-11-101, Ship/Rec & NDA/NDA SPLY Fan Running	Binary	N630:500
RF-11-101-S	SF-11-101, Ship/Rec & NDA/NDA RETN Fan Running	Binary	N630:504
11-TI-627-SP	AH-11-101, NDE/NDA Area Current Temp Set Point	Integer	N630:424
PCS To HVAC DCS Via Communication Link			
AH-11-101-ST	AH-11-101, AHU Start Pulse	Binary	N630:432
AH-11-101-SP	AH-11-101, AHU Stop Pulse	Binary	N630:440
AH-11-101-QC	AH-11-101, Operator Or To Occupied Cycle	Binary	N630:448
AH-11-101-UC	AH-11-101, Operator Or To Unoccupied Cycle	Binary	N630:456
11-TI-627-SP	AH-11-101, NDE/NDA Temperature Set Point	Integer	N630:424
Hardwired To PCS			
11-XA-621	Ship/Rec & NDA/NDA AHUC Trouble Alarm	Digital	I:011/03
Hardwired From PCS			
AH-11-101-SD	Shipping/Receiving AHU RAD Shutdown	Digital Out	O:016/00
End of Table			

Table 10-4. Computer And Control Room HVAC

Tag	Description	Type Of Sig.	PLC Register
HVAC DCS To PCS Via Communication Link			
11-PDISL-633A	SF-11-501A, Supply Fan Not Running	Binary	N630:616
11-TI-635A	AH-11-501A, Mixed Air Temperature	Integer	N630:584
11-PDISH-631A	AH-11-501A, Pre Filter Dirty	Binary	N630:620
11-PDISH-632A	AH-11-501A, Final Filter Dirty	Binary	N630:624
11-TI-637A	AH-11-501A, Supply Air Temperature	Integer	N630:588
11-MI-632A	AH-11-501A, Control Room Humidity	Integer	N630:592
11-MI-632A-SP	AH-11-501A, Control Room Humidity Set Point	Integer	N630:520
11-TI-632A	AH-11-501A, Control Room Temperature	Integer	N630:596
11-TI-632A-SP	AH-11-501A, Control Room Temperature Set Point	Binary	N630:512
SF-11-501A-S	SF-11-501A, Supply Fan Running	Binary	N630:628
11-PDISL-633B	SF-11-501B, Supply Fan Not Running	Binary	N630:632
11-TI-635B	AH-11-501B, Mixed Air Temperature	Integer	N630:600
11-PDISH-631B	AH-11-501B, Pre Filter Dirty	Binary	N630:636
11-PDISH-632B	AH-11-501B, Final Filter Dirty	Binary	N630:640
11-TI-637B	AH-11-501B, Supply Air Temperature	Integer	N630:604
11-MI-632B	AH-11-501B, Control Room Humidity	Integer	N630:608
11-MI-632B-SP	AH-11-501B, Control Room Humidity Set Point	Integer	N630:536
11-TI-632B	AH-11-501B, Control Room Temperature	Integer	N630:612
11-TI-632B-SP	AH-11-501B, Control Room Temperature Set Point	Integer	N630:528
SF-11-501B-S	SF-11-501B, Supply Fan Running	Binary	N630:644
PCS To HVAC DCS Via Communication Link			
AH-11-501A-ST	AH-11-501A, AHU Start Pulse	Binary	N630:544
AH-11-501A-SP	AH-11-501A, AHU Stop Pulse	Binary	N630:552
11-TI-632A-SP	AH-11-501A, Control Room Temperature Set Point	Integer	N630:512
11-MI-632A-SP	AH-11-501A, Control Room Humidity Set Point	Integer	N630:520
AH-11-501B-ST	AH-11-501B, AHU Start Pulse	Binary	N630:560
AH-11-501B-SP	AH-11-501B, AHU Stop Pulse	Binary	N630:568
11-TI-632B-SP	AH-11-501B, Control Room Temperature Set Point	Integer	N630:528
11-MI-632B-SP	AH-11-501B, Control Room Humidity Set Point	Integer	N630:536
Hardwired To PCS			
11-XA-631A	Computer And Control Room AHU A Trouble Alarm	Digital In	I:010/10
11-XA-631B	Computer And Control Room AHU B Trouble Alarm	Digital In	I:010/11
End of Table			

Table 10-5. Administration Area HVAC System/Plant

Tag	Description	Type Of Sig.	PLC Register
HVAC DCS To PCS Via Communication Link			
11-PDISL-644	RF-11-401, Return Fan Not Running	Binary	N630:716
11-TI-641	AH-11-401, Outside Air Temperature	Integer	N630:692
11-TI-642	AH-11-401, Mixed Air Temperature	Integer	N630:696
11-PDISH-641	AH-11-401, Pre Filter Dirty	Binary	N630:720
11-PDISH-642	AH-11-401, Final Filter Dirty	Binary	N630:724
11-PDISL-643	AH-11-401, Supply Fan Not Running	Binary	N630:728
11-TI-645	AH-11-401, Supply Air Temperature	Integer	N630:700
11-FI-643	AH-11-401, Supply Air Flow	Integer	N630:704
11-PDI-645	AH-11-401, Supply Air Pressure	Integer	N630:708
11-FI-642	RF-11-401, Return Air Flow	Integer	N630:712
SF-11-401-S	SF-11-401, Admin Area Supply Fan Running	Binary	N630:732
RF-11-401-S	RF-11-401, Admin Area Return Fan Running	Binary	N630:736
PCS To HVAC DCS Via Communication Link			
AH-11-401-ST	AH-11-401, AHU Start Pulse	Binary	N630:652
AH-11-401-SP	AH-11-401, AHU Stop Pulse	Binary	N630:660
AH-11-401-OC	AH-11-401, OPS Override Occupied Cycle	Binary	N630:668
AH-11-401-UC	AH-11-401, OPS Override Unoccupied Cycle	Binary	N630:676
Hardwired To PCS			
11-XA-641	C-11-401, Admin Area Controller Trouble Alarm	Digital In	I:010/04
End of table			

Table 10-6. Administration Locker Room HVAC

Tag	Description	Type Of Sig.	PLC Register
HVAC DCS To PCS Via Communication Link			
11-TI-665	AH-11-301, Supply Air Temperature	Integer	N630:792
11-PDISH-661	AH-11-301, Pre Filter Dirty	Binary	N630:800
11-PDISH-662	AH-11-301, Final Filter Dirty	Binary	N630:804
11-PDISL-663	SF-11-301, Supply Fan Not Running	Binary	N630:663
11-TI-668	AH-11-301, Locker Room Area Temperature	Integer	N630:796
11-TI-668-SP	AH-11-301, Locker Room Temperature Set Point	Integer	N630:744
EF-11-301-S	Exhaust Fan Running	Binary	N630:812
AH-11-301-S	Administration Locker Room AHU Running	Binary	N630:816
PCS To HVAC DCS Via Communication Link			
AH-11-301-ST	AH-11-301, AHU Start Pulse	Binary	N630:752
AH-11-301-SP	AH-11-301, AHU Stop Pulse	Binary	N630:760
AH-11-301-OC	AH-11-301, OPS Override Occupied Cycle	Binary	N630:768
AH-11-301-UC	AH-11-301, OPS Override Unoccupied Cycle	Binary	N630:776
11-TI-668-SP	AH-11-301, Locker Room Area Temp Set Point	Integer	N630:744
Hardwired To PCS			
11-XA-661	C-11-301, Locker Room AHU Controller Trouble Alarm	Digital In	I:010/05
End of table			

Table 10-7. Chilled Glycol HVAC System/Plant Control

Tag	Description	Type Of Sig.	PLC Register
HVAC DCS To PCS Via Communication Link			
11-FI-652	Chilled Glycol Prim Secry Bridge Flow	Integer	N630:896
P-11-101A-S	P-11-101A Chilled Glycol Dist Pmp Running	Binary	N630:900
P-11-101B-S	P-11-101B Chilled Glycol Dist Pmp Running	Binary	N630:904
P-11-102A-S	P-11-102A Chilled Curc Pump Running	Binary	N630:908
P-11-102B-S	P-11-102B Chilled Curc Pump Running	Binary	N630:912
PCS To HVAC DCS Via Communication Link			
P-11-101A-ST	Chilled Glycol Dist Pump A Start Pulse	Binary	N630:828
P-11-101A-SP	Chilled Glycol Dist Pump A Stop Pulse	Binary	N630:836
P-11-101B-ST	Chilled Glycol Dist Pump B Start Pulse	Binary	N630:844
P-11-101B-SP	Chilled Glycol Dist Pump B Stop Pulse	Binary	N630:852
P-11-102A-ST	Chiller Circulation Pump A Start Pulse	Binary	N630:860
P-11-102A-SP	Chiller Circulation Pump A Stop Pulse	Binary	N630:868
P-11-102B-ST	Chiller Circulation Pump B Start Pulse	Binary	N630:876
P-11-102B-SP	Chiller Circulation Pump B Stop Pulse	Binary	N630:884
Hardwired To PCS			
11-XA-651	C-11-101, Chilled Glycol Cont Trouble Alarm	Digital In	I:010/06
End of Table			

10.3 USER INTERFACES

10.3.1 Operations

The Operations User Interface is indirectly through RTAP (Real Time Applications Platform) from the terminals located at the consoles and in the dispatcher's office. Any user interaction made at the RTAP interface is sent to PLC 104. HVACCom monitors the PLC and detects the changes made by the operator. They are then sent to the HVAC DCS (Distributed Control System).

10.3.2 Programming

The Programming User Interface is through COM0 of the Co-processor module located in CNR-104. Using a PC or Laptop and a serial cable you connect to the Co-processor.

The communications parameters are:

a) Baud rate: 9600
b) Parity: N
c) Data Bits: 8
d) Stop Bits: 1

To activate the menu press the spacebar and wait (because HVACCom is doing a large amount of processing it can take a few seconds for the menus to respond – please be patient). The main menu is shown below:

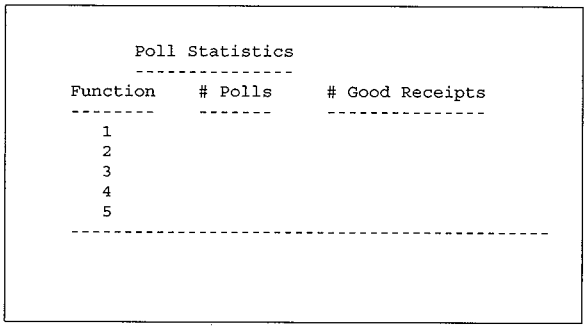
Figure 1 -- HVACOM Main Menu

```
--------------------------
|      HVACOM Menu       |
--------------------------
1 - enable sw tracing
2 - enable msg tracing
3 - stats
-------------------------
I'm waiting......
```

There are three (3) options that you can choose from. The first one, *enable sw tracing* starts the software tracing to the screen. If you want to capture any of it (it flys by pretty fast) you should first enable logging in whatever terminal package you are using (in PCBridge hit **C**onfigure/**D**isk and enter a file name to log to). To stop the tracing hit the spacebar.

The second option, *enable msg tracing* starts the message tracing to the screen. The message tracing prints every message that is sent to and received from the HVAC DCS. If you want to capture any of it (it flys by pretty fast) you should first enable logging in whatever terminal package you are using (in PCBridge hit **C**onfigure/**D**isk and enter a file name to log to). To stop the tracing hit the spacebar.

Figure 2 -- Poll Statistics Screen



The final option, *stats*, gives the statistics of the number of times each function has been polled and the number of good responses from the HVAC DCS.

10.4 CONFIGURATION

The configuration for HVACom is stored in a CSV (Comma Separated Values) file named *hvaccom.csv* (an example is shown below). There are 5 (five) functions defined in the file. The functions are processed in order as described earlier. As described in the configuration file the following rules apply when modifying the file.

- As many comment lines as are required can be entered between function definitions but do not place comment lines in the middle of function definitions. All comment lines begin with a # symbol
- The fields are separated by a comma

- The fields are:
  Tagname, point type, N file, starting word,

10.5 DATA FLOW

10.6 DETAILED DESIGN DESCRIPTION

Figure 3 -- Example HVACOM CSV File

```
# hvaccom.csv,,,,
# as many comment lines as you like,,,,
# each field is separated by a comma,,,,
# start the tag definitions for the functions,,,,
# first line is function name,,,,
# tagname,tagtype,file number, file word,
# valid tagtypes: 1 = Digital Read Only,,,,
# 2 = Digital Read.Write,,,,
# 3 = Analog Read Only,,,,
# 4 = Analog Read.Write,,,,
Function 1,,,,
H11.PDISL.603A,1,630,336,
H11.PDISL.603B,1,630,352,
# each function separated by a comment line,,,,
Function 2,,,,
H11.FI.314,3,630,56,
H11.FI.316,3,630,60,
H11.FI.371,3,630,64,
# each function separated by a comment line,,,,
Function 3,,,,
H11.PDISH.611A,1,630,104,
SF.11.101.S,1,630,500,
H11.PDISH.611B,1,630,108,
RF.11.101.S,1,630,504,
# each function separated by a comment line,,,,
Function 4,,,,
H11.TI.601A,3,630,280,
H11.TI.637A,3,630,588,
H11.TI.605A,3,630,284,
H11.TI.635B,3,630,600,
H11.TI.601B,3,630,296,
# Writable tags,,,,,
#..............WRITE TAG.............|VERIFY TAG,,,,
# tagname,tagtype,file number,file word,tagname,
Function 5,,,,,
H11.FI.617A.SP,4,630,0,H11.FI.617A,
H11.FI.617B.SP,4,630,8,H11.FI.617B,
FT.11.201A.SP,2,630,16,EF.11.201A.S,
FT.11.201A.ST,2,630,24,EF.11.201A.S,
FT.11.201B.SP,2,630,32,EF.11.201B.S,
FT.11.201B.ST,2,630,40,EF.11.201B.S,
```

HVACComm is running on the co-processor and communicates with the Andover CMX via a serial cable (using COMM 1). The HVACComm s/w emulates an operator typing commands at a command prompt provided by the CMX. All commands/requests from HVACComm must wait for the command prompt from the CMX.

HVACComm writes all data into the PLC over the PLC backplane. The data is then read by RTAP out of the PLC over the LAN.

The data path from the operator on RTAP and the CMX is two-way, i.e. data values are read from the CMX for display on RTAP and setpoints values are written to the CMX as entered by the operator on RTAP.

HVACComm alternates reading and writing data. If there is no new data to be written, the write phase is skipped.

Data is read from the CMX in blocks (referred to as functions that are defined on the CMX). The blocks are prioritized into four (5) levels. The reading of the functions is staggered so that the higher priority items are read more often than the lower priority items. An example of the read sequence is shown below (each function is represented by its priority number, i.e. 1 through 5):

1,2,1,2,3,1,2,1,3,4,5, repeat ad nauseum.

The data sent back from the CMX is in blocks with seven (7) values per line, each value is comma separated, and the max field size is eight (8) characters. The general sequences are described below.

Function Request Example:

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
R> FunctionName<cr><lf>
FunctionName<cr><lf>
value001 , value002 , value003 , value004 , value005 , value006, value007<cr><lf>
value008 , value009 , value010 , value011 , value012 , value013, value014<cr><lf>
value015 , value016 , value017 , value018 , value019 , value020, value021<cr><lf>
value022 , value023 , value024<cr><lf>
R>
```

PCS request

HVAC CMX response

HVAC CMX next command prompt

Write Example:

```
        1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
R> TagName = 36.54<cr><lf>
R> P TagName<cr><lf>
TagName = 36.54<cr><lf>
R> FunctionName<cr><lf>
```

NOTES:

1. Objects enclosed in <> are special characters where:
   <cr> = carriage return
   <lf> = line feed

in general, we will be requesting functions, but when a write is done, we will be writing to a single tag and then occasionally reading a specific tag

HVACCom is made up of two (2) executables *cmxcom* and *hvacc*. The first, *cmxcom,* is a signal handler that sits on the port RX signal waiting for data in the comm port from the HVAC DCS. It copies the received data to a common memory module that is created by *hvacc.*

The other executable is the main one – *hvac*. This one does all of the real work and interfaces to all of the equipment (see below). The only executable that needs to be called from the command line is *hvac* and it will start up *cmxcom.*

10.6.1 CMXCOM

Cmxcom is the data receive executable for Hvaccom. Its sole task is to wait for data in comm1 and to copy the data into a common memory file that is created by *hvacc.* It was necessary to create a separate executable in order to be a signal handler and wait for the specific

system signal. It is necessary for the process to sleep to allow the system to wake the process when the specified signal occurs.

10.6.1.1 Cmxcom.c

This is the main code for cmxcom. First it links to the data module created by *hvacc*. Next, it opens and flushes comm1 for data receipt. Then the signal handler is registered using the *intercept()* call. The rest of main loops forever by first requesting a signal be sent on receipt of data from the comm port and then going to sleep. It is important to note the call to *sigmask(1)* before the signal request is made. This ensures that no signals get missed while making the call to *_ss_ssig()* to request the signal.

When the signal occurs, the function *cmxcom_read()* is called which reads the data out of the comm port buffer and places it into the common data area which is pointed to by

```
dm_data         *cmxcom_data
```

To release the common data area when cmxcom quits a call needs to be made to "os_unlink".[1]

10.6.1.2 Utils.c

This code module contains some common routines used by both *cmxcom* and *hvacc* including the tracing functions and the function for opening and initializing the comm port used for communications with the HVAC DCS.

1 When a module is created the os (operating system) keeps a count of the number of processes that are linked to it. When the process count reaches 0, the module is removed from memory.

10.6.2 Example CMXCOM Makefile

An example makefile is shown in Figure 4:

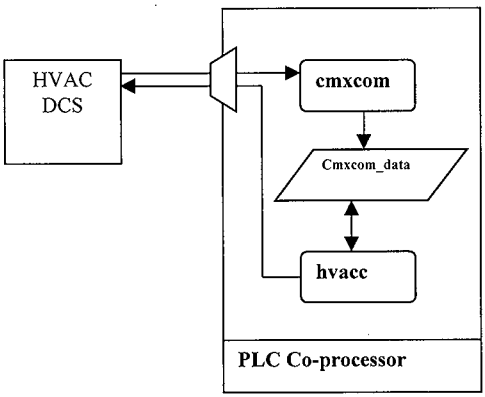
Figure 4 -- Example CMXCOM Makefile

```
# makefile
# CMXCOM
#

CC = xcc
LC = l68
BASE = c:\work\src
CSRC = $(BASE)\cmxcom
INC = $(BASE)\include
LIB = c:\mwos\os9\68000\lib
DEF = c:\mwos\os9\src\defs
CLIB = c:\mwos\os9\68000\lib
CDEF = c:\mwos\os9\src\defs
RDIR = $(CSRC)

CFLAGS = -i -b -g -o0 -mw=c:\mwos -v=$(INC) -w=$(CLIB) -ol=M=20K
LFLAGS = -v -g -l=$(CLIB)\clib.l -l=$(CLIB)\sys_clib.l -l=$(CLIB)\os_lib.l
#LFLAGS = $(CLIB)\cstart.r


PROG = cmxcom
FILES = cmxcom.r $(BASE)\utils\utils.r

$(PROG) : $(FILES)
        $(CC) $(CFLAGS) -il=$(LFLAGS) $(FILES) -f=$(PROG)

$(BASE)\utils\utils.r : $(BASE)\utils\utils.c
        cd $(BASE)\utils ; os9make -u
```

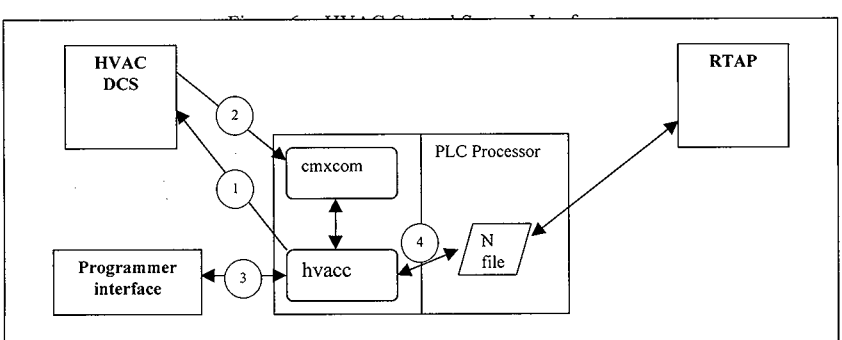
10.6.3 Data Flow

10.7 HVACC

Figure 5 -- HVACC Data Flow Diagram



HVACC is the master executable that does the bulk of the work. It is made up of six (6) source modules hvaccom.c, config.c, cmx.c, dtl.c, utils.c, and user.c. Each source module contains all of the code used for that function. For example, the module config.c contains all of the code used for processing the configuration file and for placing that data into the appropriate data structures.



The *HVAC* interfaces are:

1. Direct through comm1 for transmitting to the HVAC DCS
2. Through a common memory module for data received from the HVAC DCS via *cmxcom* through comm1
3. Direct through comm0 for the programmer interface
4. Over the PLC backplane to memory in the PLC which is read and written by RTAP

10.7.1 Data Structures

The main structure is *poll_function*. All of the information for the data to be read from the CMX is contained in an array of *poll_function* structures. The information is read from the configuration file and placed into the structures by config.c. Each *poll_function* contains the name of the function (the actual name of the function in the CMX), the number of data points (or tags) contained in the function, and an array of the data points in a structure called *point*.

```
typedef struct poll_function
{
        char    function_name[20];
        int     num_points;
        point   point[ MAX_POINTS ];
} poll_function;
```

The *point* structure holds all of the information about a specific point or tag (i.e. a single item of data from the CMX). The information required includes the tagname (as referenced by the 13461 specification), the tag type (digital or analog), the data size in the PLC (number of PLC words), the PLC file number, the PLC starting word within that file number, two dtl handles, and the data.

The dtl handles are like file handles except instead of file streams they reference the dtl interface which is used to communicate with the PLC over the PLC backplane.

```
typedef struct point
{
        char            tagname[20];
        int             tagtype;
        int             data_size;
        int             file_number;
        int             file_word;
        unsigned        dtl_handle_r;  /* for reads from the PLC */
        unsigned        dtl_handle_w;  /* for writes to the PLC */
        data_store      data;
} point;
```

The data is a structure called *data_store* which is a union of two structures *digital* and *analog*. The *digital* structure is used for digital points and the *analog* structure is used for analog points. These relate directly to the data layout used in the PLC.

```
typedef union data_store
{
        digital digital;
        analog  analog;
} data_store;

        typedef struct digital
        {
                short int       read_status;
                short int       read_value;
                short int       write_status;  /* here down for r/w only */
                short int       copro_index;
                short int       plc_index;
                short int       write_value;
                short int       future1;
                short int       future2;
        } digital;

        typedef struct analog
        {
                short int       read_status;
                short int       read_value_int;
                short int       read_value_frac;
                short int       write_status;          /* here down for r/w
        only */
                short int       copro_index;
                short int       plc_index;
                short int       write_value_int;
                short int       write_value_frac;
        } analog;
```

PLC data configuration:

Digital Read/Write Tags

0	1	2	3	4	5	6	7
READ STATUS	READ VALUE	WRITE STATUS	COPRO INDEX	PLC INDEX	WRITE VALUE	FUTURE	FUTURE

Analog Read/Write Tags

0	1	2	3	4	5	6	7
READ STATUS	READ VALUE INTEGER	READ VALUE FRACT	WRITE STATUS	COPRO INDEX	PLC INDEX	WRITE VALUE INTEGER	WRITE VALUE FRACT

Field Definitions

1. READ STATUS — status of the last read attempt
   0 reset
   1 success
   −1 failure
2. READ VALUE (INTEGER) — the whole number portion of last read value from the CMX
   digital tags are represented as 0 = off and 1 = on
3. READ VALUE FRACTIONAL — the fractional number portion of last read value from the CMX
   only used by the analog tags
4. WRITE STATUS — status of the last write attempt
   0 DONE,
   1 PENDING,
   2 WRITTEN,
   3 CONFIRMED,
   −2 failure to WRITE
   −3 failure to CONFIRM
5. WRITE VALUE (INTEGER) — the whole number portion of last write value to the CMX
   digital tags are represented as 0 = off and 1 = on
6. WRITE VALUE FRACTIONAL — the fractional number portion of last write value to the CMX
   only used by the analog tags
7. PLC INDEX — used to indicate to the co-processor that a value has changed
   and needs to be written to the CMX
   set by RTAP
8. COPRO INDEX — set to the PLC INDEX value by the co-processor
   (HVACComm) when the write has been attempted

The other main structure is the *rwpoint* structure which is used for the read/write data. It is similar to the poll_function structure except that instead of referencing an array of points, it references an array of point pairs. Each point pair consists of the write point and an associated read or verify point. This was an original design criteria which was later removed during startup.

```
typedef struct rwpoint
{
        char                    function_name[20];
        int                     num_points;             /* total number of rw tags */
        int                     write_pend;             /* see design notes */
        read_write_point        point[ MAX_RW_TAGS ];  /* array of rw tags */
} rwpoint;

typedef struct read_write_point
{
        point   w;      /* the write point info */
        point   *r;     /* the read (verify) point info */
} read_write_point;
```

The common data module *cmxcom_data* is defined by the structure *dm_data*:

```
typedef struct dm_data
{
        char            buffer[ BUFFER_SIZE ];
        int             readpos, writepos;
        unsigned char   sw_trace_enable;
        unsigned char   msg_trace_enable;
} dm_data;
```

The *buffer* field is the data buffer that is written to by *cmxcom* and read from by *hvacc*. The fields readpos and writepos are pointers to the next position in the buffer to read from and write to. The two enable fields are the software and message trace enable switches use to enable/disable tracing for the two executables.

The final set of structures are used for recording the status of the communications and relaying that status to PLC registers. The *stats* structure is the parent structure that contains the statistics data and a dtl handle for data transfer to the PLC.

```
typedef struct stats
{
        stat_data       data;
        unsigned        dtl_handle;
} stats;
```

The *stat data* structure contains a general status field for the status of the co-processor, a write fail field where any write failure is written, and an array of 5 poll statistics records. The general status field only uses the 4 lower order bits as defined by the table.

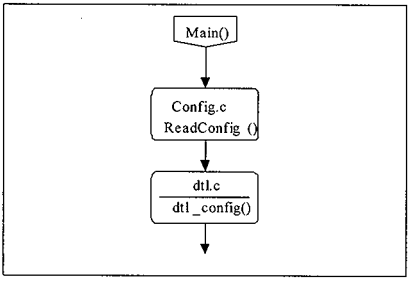
Table 10-8 Status Data Control Bits		
Bit	**Description**	**State Representation**
0	Co-processor low battery	0 = low, 1 = ok
1	Watchdog, set by HVACComm at least every second, monitored by PLC and reset (aka PLC-5 online status – should always be 1)	1 = on-line
2	Expander presence	1 = present
3	PLC-5 reset enable	1 = enabled
	End of Table	

The watchdog (bit 1) is monitored by the PLC. If the co-processor fails to set the watchdog bit for 1 minute an alarm is triggered and displayed in RTAP.

```
typedef struct stat_data
{
        short int               gen_status;
        short int               write_fail;
        short int               future1;
        short int               future2;
        short int               future3;
        short int               future4;
        short int               future5;
        short int               future6;
        short int               future7;
        short int               future8;
        poll_stat_rec   poll_status_record[5];
} stat_data;

        typedef struct poll_stat_rec
        {
                short int       num_polls;
                short int       num_good_xresponses;
        } poll_stat_rec;
```

10.7.2 Hvaccom.c

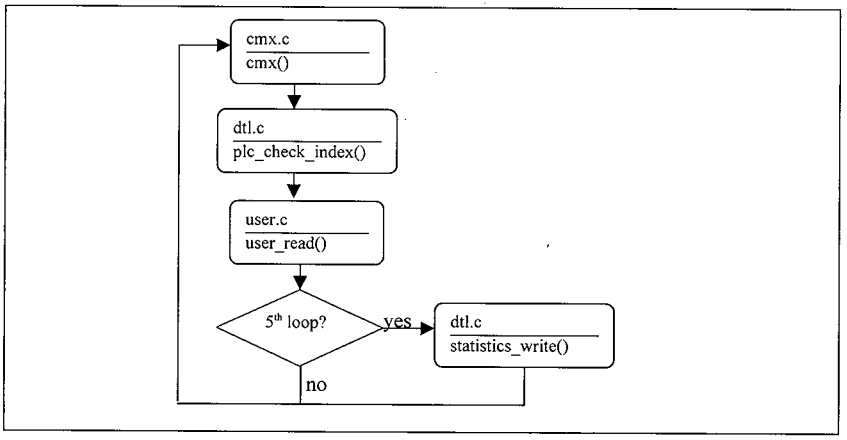
Figure 7 -- Main Module Configuration



This is the main code module. First, the common data module is created. Next, cmxcom is called. Then config.c is called to read the configuration file. Then the dtl interface is initialized.

The module loops forever alternating between processing cmx data, checking the plc for any pending writes, and checking the programming port for user interaction. Every 5th cycle it writes the statistical information to the PLC.

Figure 8 -- Module Data Flow Diagram



10.7.2.1 Config.c

This module reads in the configuration file (hvaccom.csv) and parses out the configuration data which is placed into the appropriate data structures (*poll_function* and *rw_point*).

10.7.2.2 Cmx.c

This source module contains all of the code for communications with the CMX including connecting and logging on to the CMX, writing function requests and user changes, and the parsing of received data.

First the PCS must log onto the CMX using a login id and password. The login id used is "sii" and the password is "sii" (no quotes). Once logged in the CMX responds with a command prompt ">R". Then *hvacc* can begin the data exchange.

Hvacc alternates between writing and reading data. After every read, the PLC is checked for any pending data to be written. If there is any it is written. If there are no pending writes, another read is done. Reading is done by requesting a function from the CMX. This is done by writing the name of the function to the CMX and waiting for the response.

As mentioned earlier, the data is split into 5 groups or functions (functions 1 through 4 are read only data and function 5 is the read/write data). The functions are prioritized 1 through 5 with 1 being the highest priority. The polling is sequenced so that the frequency of polling is proportional to the priority of the function (i.e. function 1 is polled most frequently, function 2 next most, and so on). The actual polling sequence that is hardcoded is:

1,2, verify,1,2, verify,3,1, verify,2,1, verify,3,4, verify,5, repeat ad nauseum.

The "verify" functions listed are not functions - they are the poll slots that are allocated for doing a verify poll is there are any waiting. The write sequence works as follows:

1) The co-processor compares the PLC INDEX and the CO-PRO INDEX fields looking for a mismatch to indicate there is new data to send.
2) The WRITE STATUS is set to 1 (PENDING) and a counter in incremented.
3) The new value is written to the CMX, the WRITE STATUS is set to 2 (WRITTEN), and the tag is added to the verify array
4) Next "verify" poll slot the verify array is checked for any waiting tags
5) The verify tag is polled to the CMX
6) If the response has the same value as that written then the WRITE STATUS is set to 3 (CONFIRMED)
7) Otherwise the WRITE STATUS is set to -3 (NOT CONFIRMED)

When a new tag value is written to the CMX the CMX should change its tag's value immediately which is why only one verify attempt is made.

10.7.2.3 Dtl.c

The dtl.c module contains all of the PLC interface code including initialization of the co-processor, obtaining the dtl handles for passing data to the plc, and the functions that read from and write to the PLC.

The co-processor is initialized with two co-processor specific calls (i.e. non-standard OS9):

CC_INIT() general initialization call
DTL_INIT(x) where x is the number of dtl handles to be defined

After initialization the dtl handles are defined for all of the tags.

10.7.2.4 User.c

The user.c module contains all of the routines for the user (or programmer) interface through comm0.

10.7.2.5 Utils.c

This code module contains some common routines used by both *cmxcom* and *hvacc* including the tracing functions and the function for opening and initializing the comm port used for communications with the HVAC DCS.

10.7.3 Makefile

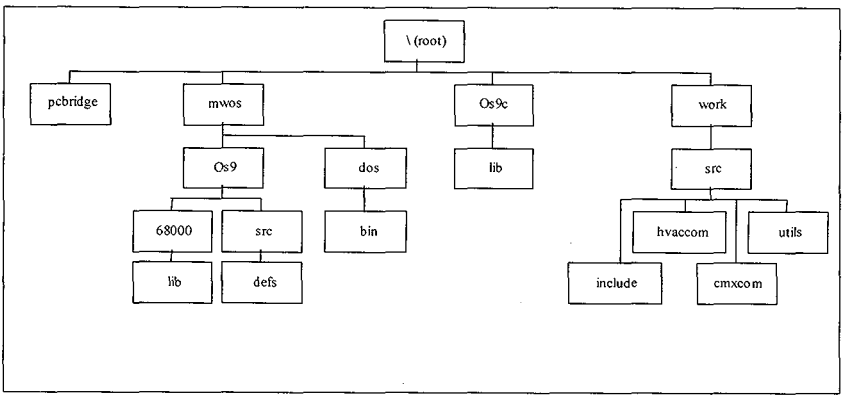
Figure 9 -- Example Makefile

```
#
# makefile
# HVACCOM
#

CC = xcc
LC = l68
BASE = c:\work\src
CSRC = $(BASE)\hvaccom;$(BASE)\utils
INC = $(BASE)\include
LIB = c:\mwos\os9\68000\lib
DEF = c:\mwos\os9\src\defs
CLIB = c:\mwos\os9\68000\lib
CDEF = c:\mwos\os9\src\defs
RDIR = $(CSRC)

CFLAGS = -i -b -g -o0 -mw=c:\mwos -v=$(INC) -w=$(CLIB) -ol=M=20K
LFLAGS = -v -g -l=$(CLIB)\clib.l -l=c:\os9c\lib\ablib.l -l=$(CLIB)\sys_clib.l -l=$(CLIB)\os_lib.l
#LFLAGS = $(CLIB)\cstart.r


PROG = hvacc
FILES = hvaccom.r $(BASE)\utils\utils.r config.r dtl.r cmx.r user.r
```

10.8 BUILD ENVIRONMENT

The directory structure used during development is shown below in Figure 10.

Figure 10 -- Development Directory Structure



The directories from left to right contain the following:

pcbridge	the pcbridge software for terminal emulation
...\68000\lib	the OS9 standard libraries for the Motorola 68000 processor
...\src\defs	the OS9 standard include files
...\bin	the DOS executables for compiling and linking
os9c\lib	the Allen-Bradley specific library for the co-processor
...\src\include	the developed include files
...\src\hvaccom	the c source modules for hvacc
...\src\cmxcom	the c source modules for cmxcom
...\src\utils	the c source module utils.c

10.8.1 Libraries

The libraries used were from Microware (version x.yy) for the OS9 standard libraries and from Allen-Bradely (version x.yy) for the co-processor library. The Microware libraries are placed in the directory *\mwos\os9\68000\lib* and the associated system include files are placed in the directory *\mwos\os9\src\defs*.

10.8.2 Miscellaneous Notes

- Os9make was used to build all executables using the included make files
- Long filenames are not accepted
- Os9make which calls xcc, be68k, and r68 all run in DOS
- The following must be added to your autoexec.bat file:

```
rem *** OS9 Development ***
rem SET PATH=%PATH%;C:\OS9C\BIN;C:\PCBRIDGE;C:\MWOS\DOS\BIN;
SET PATH=%PATH%;C:\PCBRIDGE;C:\MWOS\DOS\BIN;
SET CDEF=C:\MWOS\OS9\SRC\DEFS;c:\mwos\src\defs
SET CLIB=C:\MWOS\OS9\68000\LIB
SET PCBRIDGE=C:\PCBRIDGE
SET GRPUSER=0.0
rem ***************************
Set MWOS=C:\MWOS
Set DOS4G=quiet
Set RPATH=C:\MWOS\OS9\68000\CMDS
Set TARGET=OS9Target
Set TMPDIR=C:\TEMP
```

Table of Contents

List of Tables

11.0 POWERED ROLLER CONVEYORS

11.1 OVERVIEW

This section describes the roller conveyor devices used at WRAP. The Horsely Company[1] provided the majority of independent roller conveyors at WRAP. Additional contractors provided roller conveyors as parts of device assemblies (e.g., NDE/NDA equipment, TRUPACT conveyor, Supercompactor conveyors, etc...).

For additional information concerning roller conveyor devices, please refer to vendor information number 22739 and drawings H-2-131853 and H-2-131856.

11.2 AUTOMATED GUIDED VEHICLE TRANSFERS

Drums are moved in the WRAP facility using Automated Guided Vehicles (AGVs). AGVs move between different conveyors and transfer drums to and from those conveyors. During drum transfer, the AGV travels to the conveyor and signals that it is present via an infrared sensor (IR Coms). Drum tracking information is exchanged between the AGVCS and the conveyor via NETCOM prior to and during the drum transfer.

Each conveyor contains a pair of infrared communicators (IR COMS) transmit and receive sensors. These sensors are used for communication between the AGV and the Carousel PLC. When a drum is transferred to or from the conveyor, the AGV will approach the pickup point and an infrared sensor will signal its presence. Upon completion of a "handshake", request for transfer, and permissive for transfer, the conveyor roller motor be energized and the drum will be transferred from or onto the conveyor deck of the AGV.

11.3 DRUM STORAGE CAROUSELS

The WRAP facility includes two Drum Storage Carousels, tag numbers 104-CV-09-102 (102) and 107-CV-09-202 (202). Carousel 102 is used to store drums waiting for NDE or NDA analysis and for drums awaiting transfer to the WRAP process area. Carousel 202 is used to store drums waiting processing or transfer out of the process area.

The carousels act as buffers for drum handling. All drums entering a carousel will have had a bar code label placed on their lids. This bar code label allows each drum to be easily identified. As drums enter the carousel from an AGV, the carousel bar code scanner reads the drum label and registers it with the Plant Management System (PMS).

Each carousel contains a programmable logic controller (PLC) which controls conveyor actions and receives the data collected by the carousel bar code reader. Each carousel PLC is connected to a data highway serial network associated with a primary PLC located in a CNR cabinet. The data highway connection is used to send commands to the carousel from the PCS and retrieve information from a carousel. Carousel 102 is connected to the PLC in 104-CNR-12-101 and carousel 202 is connected to the PLC in 104-CNR-12-102.

As a particular drum is needed, the carousel programmable logic controller (PLC) will receive a drum I.D. number request through the data highway connection, which will initiate a search sequence. This request causes the carousel conveyors to circulate in an indexing fashion with each drum passing under the bar code scanner until the needed drum is located. If the drum is the one requested, it will be moved to the sidetrack spur, and the PMS will be notified through the data highway connection that the drum is staged and waiting for pickup.

The bar code reader for each carousel is programmed using a personal computer running a terminal emulation program (e.g., PROCOMM, Hyperterminal). The computer is connected to either communications port 1 or port 2 using a standard RS-232 serial communications cable with a null-modem adapter. For complete programming information, please review the "Mini-X™ Decoder Board Setup Software Operations Guide"[2].

11.4 SHIPPING AND RECEIVING CONVEYORS

11.4.1 Infeed Conveyors

The Shipping and Receiving Infeed Conveyors are used to transfer drums to an AGV for transport to analysis or processing. These conveyors are controlled by ladder logic resident in the PLC associated with 104-CNR-12-101 (LCU 101).

The drum jib crane (101-CR-05-102A) is used to transfer drums onto the shipping and receiving infeed conveyor (101-CV-05-101A). After all drum positions on the infeed conveyor are full, or when ready, the operator advances the first drum onto the weigh conveyor (101-CV-05-103A). Once the drum is on the weigh conveyor, the conveyor operator scans the drum bar code using fixed bar code reader 12-NE-102. When the PCS receives the bar code message, the drum location and weight are automatically updated. The drum weight is then transmitted to the DMS and compared to acceptable weight ranges. If the drum weight is acceptable, the drum is then indexed to the end of the Infeed Conveyor (101-CV-05-101B) for pickup by an AGV.

The drum jib crane (101-CR-05-102A) is also used to transfer empty drums onto the empty drum infeed conveyor (101-CV-05-105). Once an empty drum is indexed to position #9 on the conveyor, the PCS will send a message to the AGVCS indicating that an empty drum is ready for pickup.

11.4.2 Discharge Conveyors

The Shipping and Receiving Discharge Conveyors are used to return drums to the Automated Stacker / Retriever System (ASRS). These conveyors are controlled by ladder logic resident in the PLC associated with 104-CNR-12-101 (LCU 101).

After a drum has been analyzed and/or processed, the AGV will typically move the drum to the discharge conveyor (101-CV-05-102). The discharge conveyor operator will use the conveyor control panel to index drums from the discharge conveyor to the drum scale conveyor (101-CV-05-103B).

Once the drum is on the weigh conveyor and the conveyor is de-energized, the operator scans the drum bar code using portable bar code reader 12-NE-103. When the PCS receives this bar code location information, the weight information is recorded automatically. While the drum is on the weigh conveyor, the operator may apply any applicable labels that are required. Once the location, PIN, and weight information have been transmitted to the DMS, the DMS will verify the weight is within established tolerances and does not exceed waste container limitations. If the drum weight is acceptable, the jib crane (101-CR-05-102B) can then be used to remove the drum from the conveyor.

11.4.3 TRUPACT Conveyor

The TRUPACT accumulation conveyor is a 16.5-meter (54 feet) sloping gravity conveyor that handles palletized loads of fifty- five-gallon drums. This conveyor contains no motors or associated instrumentation.

11.5 NDA AND NDE CONVEYORS

11.5.1 Drum and Box Conveyors

Several conveyors are used to support drum and box transfer from an AGV to an NDE or NDA device. These conveyors are typically controlled by both the NDE or NDA device and the ladder logic resident in the PLC associated with 104-CNR-12-101 (LCU 101). These conveyors are listed in Table 11-1 Drum and Box ConveyorsTable 11-1.

Table 11-1 Drum and Box Conveyors

Description	Conveyor	Device
Drum X-Ray (NDE) Vault A Conveyor	104-CV-09-101A	104-ND-06-104A
Drum X-Ray (NDE) Vault B Conveyor	104-CV-09-101B	104-ND-06-104B
Drum PAN Vault A Conveyor	104-CV-09-101C	104-ND-06-101A
Drum PAN Vault B Conveyor	104-CV-09-101D	104-ND-06-101B
Drum GEA Vault A Conveyor	104-CV-09-101E	104-ND-06-102A
Drum GEA Vault B Conveyor	104-CV-09-101F	104-ND-06-102B
Box X-Ray (NDE) Vault Conveyor	104-CV-09-106	104-ND-06-105

11.5.2 Background Drum Storage Conveyors

The Background Drum Storage Conveyors are controlled by ladder logic resident in the PLC associated with 104-CNR-12-101 (LCU 101).

Two background "white" drums which contain waste matrices which are "clean" or only have extremely low levels of contamination will be stored on the background drum storage conveyors 104-CV-09-105A & B. The drums will be removed from the conveyors each morning at the start of each shift. The drums will be processed through the PAN and GEA components to verify the facility background levels have not changed significantly since the last background check. Upon completion of the background checks, the PCS shall transfer the drums back to the background conveyors.

11.5.3 Airlock Conveyors

Six conveyors are used to transfer drums from the NDE/NDA area to the process area through the NDE/NDA area airlocks. One airlock is used to transfer drums into the process area and the second airlock is used to transfer drums from the process area. The conveyors can also be reversed to operate in the opposite direction.

Conveyors 104-CV-09-103A and 104-CV-09-103B are located outside the airlocks in the NDE/NDA area. Conveyors 104-CV-09-104A and 104-CV-09-104B are located within the airlocks. Conveyors 104-CV-09-201A and 104-CV-09-201B are located outside the airlocks in the process area.

Conveyors 201A and 201B contain weight scales that are used to measure drum weights as drums are transferred into the process area. The weight scales are connected to the PLC coprocessor in LCU 102 via an RS-232/RS-485 communications loop. For additional information on communications with the airlock weight scales, see Section 9.0.

Typical automatic airlock operation includes receipt of a drum at a conveyor outside an airlock. The airlock door adjacent to the drum is raised and the roller conveyors transfer the drum into the airlock. The door previously opened is closed. When the first door is closed, the second airlock door raises and the roller conveyors transfer the drum out of the airlock onto the conveyor outside the airlock. The second airlock door then closes.

11.6 PROCESS AREA CONVEYORS

11.6.1 Lift Tables

The WRAP facility includes fourteen (14) lift tables, tag numbers 107-LT-09-201A through -201F, -202A through -202E, and -203A through =203C. Lift Tables receive drums from an AGV, translate the drums horizontally, and vertically position the drums under the glovebox drum ports. Lift tables raise and lower using a servomotor connected to an expanding screw. As the servomotor turns counter-clockwise, the screw drive is extended, raising the lift table. When the servomotor is run in the reverse direction, the screw drive contracts, lowering the table. Lift tables contain roller decks to transfer drums to and from an Automated Guided Vehicle (AGV). The lift table roller conveyor is reversible. The conveyor runs in the "forward" direction when transferring a drum from an AGV to the lift table and runs in the "reverse" direction when transferring a drum from the lift table to the AGV.

Lift tables are connected in a serial communications loop. All lift tables supporting the LLW and LLW RWM gloveboxes are connected in a loop with the LCU 102 coprocessor. All lift tables supporting the TRU and TRU RWM gloveboxes are connected in a loop with the LCU 103 coprocessor. Ladder logic, in the programmable logic controllers for both LCU 102 and LCU 103, is used to initiate lift table sequences. The SERCOM program resident in LCU 102 and in LCU 103 is used to convert ladder logic register status into commands that are transmitted to the lift tables via the communication loops. Refer to Section 9.0 for additional lift table control information. The lift table servomotors are programmed using the Compumotor X-Series Language [3].

11.6.2 Empty Drum Staging Conveyors

There are two process area empty drum staging conveyors, tag numbers 107-CV-09-203 (203) and 107-CV-09-204 (204). These conveyors are used to store clean, empty drums to support glovebox waste processing. Conveyor 203 is used to store empty 320 liter (85 gallon) overpack drums. Conveyor 204 is used to store empty 208-liter (55-gallon) drums. The conveyors operate in a last-in first-out basis. These conveyors are controlled via ladder logic resident in the PLC located in the 104-CNR-12-103 cabinet.

11.6.3 Supercompactor Entry and Exit Conveyors

The Supercompactor assembly (107-CM-07-303) includes two conveyors, an entry and an exit conveyor. Both conveyors are controlled by the Supercompactor PLC. This PLC is connected to the PLC resident in LCU 102 via a data highway network connection. The data highway connection allows each PLC to exchange status information to enable the transfer of a drum from the transfer car (107-TC-07-101) to the Supercompactor entry conveyor.

11.7 REFERENCES

[1] The Horsley Company, Post Office Box 9815 Ogden, Utah 84409

[2] Mini-X™ Decoder Board Setup Software Operations Guide, ACCU-SORT Systems, Inc., 511 School House Road, Telford, PA 18969, 1-800-BAR-CODE, Operations Manual, 1993.

[3] Compumotor Plus Indexer User Guide, part number 88-007488-02F, Compumotor Division Parker Hannifin Corporation, 5500 Business Park Drive, Rohnert Park, CA 94928, 1996.

Table of Contents

List of Tables

12.0 AUTOMATED GUIDED VEHICLE CONTROL SYSTEM

12.1 OVERVIEW

This document describes the communication sequence between the Automated Guided Vehicle Control System (AGVCS) and Plant Control System (PCS).

12.2 SHIPPING/RECEIVING AND NDE/NDA AREAS

12.2.1 Incoming drums to NDE/NDA Area.

The AGVCS receives commands to service input conveyors for each of the six NDE and NDA vaults. The AGVCS generally handles requests in the order in which they are received by the waiting list according to the priority scheme shown in Table 12-1. "1" is the highest priority. This priority scheme is provided in the AGVCS software as a table that is readily revised as needed.

Table 12-1 AGVCS Priorities

Priority	Request Station
1	GEA Machine
2	PAN Machine
3	NDE Machine
3	Drum Infeed Conveyor
3	Airlock Conveyor
End of Table	

Requests come from instructions to pick-up empty new drums (empty new drums are sent directly to the Waste Processing area), pickup full incoming waste drums from the S/R Infeed Conveyor, pickup from a machine P/D stand, pickup from the NDE/NDA Buffer Storage Carousel (BSC), or pickup from the Background conveyors. Drums, which exit the NDE/NDA Area destined for Shipping and Receiving, are deposited on the S/R Discharge Conveyor. All conveyors are equipped to communicate to the PCS and in turn send requests to the AGVCS for any actions required. The AGVCS responds with status (when requested) and with completion messages when an AGV is finished with a requested move.

12.2.2 Infeed Conveyor

As the NDE-X vault becomes available and transmits this status to the PCS, the PCS transmits a "Drop-off at NDE-X" command to the AGVCS. This message is stored in the AGVCS. Whenever the Infeed Conveyor notifies the PCS that a drum is available for pick up, the PCS checks the drum's process route designation to verify the next destination for the waste drum and then transmit a combined pick-up command / drop-off request to the AGVCS. The commands issued are component specific (e.g., Infeed Conveyor, NDE-A) whereas the requests are generic (e.g., NDE)).

The AGVCS matches the pick-up at Infeed Conveyor command / drop-off at NDE request to the previously received NDE-X drop-off **COMMAND** and then issue a combined message to the AGV to pick up the drum at the Infeed Conveyor and deliver it to the NDE-X vault. The AGVCS assigns the task a priority of 3 and place it in the task queue to be completed based on priority and age of the request.

Note: It is possible that the combined message will be received by the AGVCS prior to the drop-off **COMMAND**. The AGVCS is capable of matching these messages regardless of the sequence.

Table 12-2 Drum Transfers From Infeed Conveyor To NDE Units

PCS	AGVCS
NDE-X is available for drum drop-off.	
Drop off at NDE-X **COMMAND** sent to AGVCS.	
Drum is available for pick up at INFEED CVYR received from component.	
Pick up at INFEED CVYR **COMMAND** / Drop off at NDE **REQUEST** sent to AGVCS.	
	Match Pick up at Infeed Cvyr **COMMAND** and Drop off at NDE **REQUEST** message with Drop off at NDE-X **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off **REQUEST**.
End of Table	

12.2.3 NDE to PAN (NDA)

As a PAN unit "X" becomes available and transmits this data to the PCS, the PCS responds with a PAN-X drop-off **COMMAND** to the AGVCS. This message is stored in the AGVCS. Upon completion of the NDE exam, the NDE vault notifies the PCS that the exam is complete and the drum is available for pick up. After receiving the "NDE Complete" message,

the PCS checks the process route, verify the next destination (PAN) and generate a combined "pick-up at the NDE-X **COMMAND**--drop-off at PAN **REQUEST** (generic PAN vault). The AGVCS matches the vault-specific pick-up at NDE-X **COMMAND**--generic PAN drop-off REQUEST to the previously received vault-specific PAN-X drop-off **COMMAND** and then issue a combined message to the AGV to pick up the drum at the NDE-X vault and deliver it to the PAN-X vault. The AGVCS assigns the task a priority and place it in the task queue to be completed based on priority and age of the request. Table 12-3

Table 12-3 Drum Transfers From NDE to PAN Units

PCS	AGVCS
PAN-X is available for drum drop-off.	
Drop off at PAN-X **COMMAND** sent to AGVCS.	
Drum available for pick up at NDE-X received from component.	
Pick up at NDE-X **COMMAND** / Drop off at PAN **REQUEST** sent to AGVCS.	
	Match Pick up at NDE-X **COMMAND** and Drop off at PAN **REQUEST** message with Drop off at PAN-X **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at PAN-X **REQUEST**.
End of Table	

12.2.4 PAN to GEA

As a GEA unit "X" becomes available and transmits this data to the PCS, the PCS responds with a GEA-X drop-off **COMMAND** to the AGVCS. This message is stored in the AGVCS. Upon completion of the PAN exam, the PAN-X vault notifies the PCS that the exam is complete and the drum is available for pick up. The PCS checks the process route, verify the next destination (GEA) and generate a combined "pick-up at the PAN-X **COMMAND**--drop-off at GEA **REQUEST** (generic GEA vault). The AGVCS matches the vault-specific pick-up at PAN-X **COMMAND**--generic GEA drop-off **REQUEST** to the previously received vault-specific GEA-X drop-off **COMMAND** and then issue a combined message to the AGV to pick up the drum at the PAN-X vault and deliver it to the GEA-X vault. The AGVCS assigns the task a priority and place it in the task queue to be completed based on priority and age of the request.

Table 12-4 Drum Transfers From PAN to GEA Units

PCS	AGVCS
GEA-X is available for drum drop-off.	
Drop off at GEA-X **COMMAND** sent to AGVCS.	
Drum available for pick up at PAN-X received from component.	
Pick up at PAN-X **COMMAND** / Drop off at PAN **REQUEST** sent to AGVCS.	
	Match Pick up at PAN-X **COMMAND** and Drop off at GEA **REQUEST** message with Drop off at GEA-X **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at GEA-X **REQUEST**.
End of Table	

12.2.5 Transfers from the GEA Units

All drums, with the exception of the empties, processed through the NDE/NDA Area are transferred to the GEA as a final NDE/NDA destination. Upon completion of the GEA exam, the drums may be transferred to the S&R Discharge Conveyor, Airlock Conveyor, Buffer Storage Conveyor, or the Background Drum Storage Conveyors depending on the drum's process route designation and status of the destination material handling equipment.

Upon completion of the GEA exam, the GEA-X vault notifies the PCS that the exam is complete and the drum is available for pick up. The PCS checks the process route, verify the next destination is available and generate a combined "pick-up at the GEA-X **COMMAND**-- drop-off at DESTINATION **REQUEST**.

Drop-off location is determined by the process route designation in PCS as noted below:

- Process Routes 1, 101, 102 send the drum to the S&R Discharge Conveyor if it is available, otherwise the drum is placed in the Buffer Storage Carousel.
- Process Routes 2A/B, 3A/B go to the Airlock Conveyor if the PCS verifies that a destination (glovebox or RWM carousel as default) is available in the Process Area. If neither of these Process Area destinations is available, the drum is temporarily stored in the BSC pending availability of the appropriate Process Area destination.
- Process Routes 7A/B go to the Background Drum Conveyors A and B respectively
- Process Route 8 goes to the Buffer Storage Carousel.

The AGVCS matches any existing drop-off **COMMANDS** with similar pick-up **COMMANDS**--drop-off **REQUESTS** received and place the task in a queue where the AGVCS executes the task based on its age and priority.

12.2.6 Transfer Through Airlock Conveyors to Process Area

The PCS maintains counters for the number of positions available in the Process Area for drums waiting processing the TRU and LLW gloveboxes. The maximum number is three (one at the Entry port and two in the RWM Carousel). Whenever the PCS generates a combined message to transfer a drum to the airlock, this counter is decremented by "1" (one less position available in the Process Area). The counter to be decremented is determined based on the process route: "2" for the TRU drums and "3" for the LLW drums. Whenever drums are removed from the Entry gloveboxes (TRU and LLW), the appropriate counter is incremented by "1".

Prior to issuing the **COMMAND/REQUEST** to transfer waste drums from the GEA to the airlock conveyor 104-CV-09-103A/B, the PCS verifies that a position is available in the Process Area to accept the drum. If there is a position available, the PCS issues the combined message.

If there is no position available the PCS issues a combined pick-up at GEA-X **COMMAND**--drop-off at BSC **REQUEST** to the AGVCS to transfer the drum from the GEA to the BSC (Note: BSC destination is one of the 10 BSC storage positions reserved for the production drums).

Waste drums transferred to airlock conveyor 104-CV-09-103A/B are transferred into the Process Area by the PCS. The PCS maintains traceability of the drum PIN and destination (based on process route designation). Note that each of the three conveyors for each airlock chain (A or B) may contain a drum at any given time.

12.2.7 Transfer Through Airlock Conveyors To NDE/NDA Area

Upon receipt of the waste drums on the airlock conveyor 107-CV-09-201B/A, the PCS transfers the waste drum through the airlock conveyor chain. As the drums are received on the NDE/NDA side of the conveyor chain (104-CV-09-103B/A), the PCS is notified that a drum is available for pick up at airlock conveyor 104-CV-09-103B/A. The PCS checks the drum's process route designation to verify the next destination for the drum. The PCS then verifies that this location is available for a drum to be dropped off.

If the destination is available, the PCS issues a combined pick-up at 104-CV-09-103B/A **COMMAND**--drop-off at DESTINATION **REQUEST** to the AGVCS (The combined message includes the S&R Discharge Conveyor or a generic NDE/NDA vault destination). The PCS

designates an NDE vault as the destination for those drums with a process route designation of "101". The PCS designates a PAN vault as the destination for those drums with a process route designation of "102". The PCS designates the Discharge conveyor as the destination for those drums with a process route designation of "103".

If the PCS checks and determines that the destination for the drum on the airlock conveyor feeding the NDE/NDA Area is unavailable, the PCS issues a combined pick-up at 104-CV-09-103B/A **COMMAND**--drop-off at BSC **REQUEST** to the AGVCS. Upon placement of airlock conveyor drums in the BSC, the PCS generates a pick-up at BSC **COMMAND**--drop-off at DESTINATION **REQUEST.** Once the processed drum is retrieved from the BSC and sent to its first NDE/NDA vault, its transfers between the NDE/NDA components are handled as noted above. Once the GEA exam is completed, the drums will be transferred to the S&R discharge conveyor.

12.2.8 Storage Buffer Carousel

The Buffer Storage Carousel contains 12 drum storage positions. The 12 positions are controlled/reserved by the PCS based on the following distribution:

- 2 positions for NDA Verification drums awaiting use at the PAN and GEA units for the start and end of shift checks (Destination Category A)
- 10 positions for "production" drums waiting transfer to NDE/NDA and S&R Area P&D points (Destination Category B)
- As the PCS receives pick up messages from NDE/NDA Area components and determines that destination is the BSC, the PCS checks the drum's process route designation and current location to determine the drum's next destination. The PCS issues a combined message containing a pick-up at NDE/NDA component **COMMAND**--drop-off at BSC **REQUEST** to the AGVCS. (Note: BSC destination is one of the 10 BSC storage positions reserved for the production drums). The AGVCS matches this message with a complimentary drop off at BSC **COMMAND**. The combined message is placed in the task queue where it is acted upon based on its priority and age.

The first example does not generate a BSC pick-up **COMMAND**--drop-off **REQUEST,** as it is not clear when the PCS conditions will allow transfer of the drum from the BSC to the Process Area. Table 12-5 illustrates the various Buffer Storage Carousel sequences.

Table 12-5 Drum Transfers to the Buffer Storage Carousel

PCS	AGVCS
Drum is available for pick up at GEA-X and drop off at Process P&D with position available in Process = "0".	
Pick up at GEA-X **COMMAND** / Drop off at BSC **REQUEST** sent to AGVCS.	
	Match Pick up at GEA-X **COMMAND** and Drop off at BSC **REQUEST** message with Drop off at BSC **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at BSC **REQUEST**.
OR	
Drum is available for pick up at GEA-X and drop off at Discharge Cvyr with Discharge conveyor unavailable.	
Pick up at GEA-X **COMMAND** / Drop off at BSC **REQUEST** sent to AGVCS.	
	Match Pick up at GEA-X **COMMAND** and Drop off at BSC **REQUEST** message with Drop off at BSC **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at BSC **REQUEST**.
When drum is stored in BSC the Pick up at BSC **COMMAND** causes the PCS to issue a Drop off at Disch Cvyr **REQUEST**	
OR	

Table 12-5 Drum Transfers to the Buffer Storage Carousel

PCS	AGVCS
Drum is available for pick up at Airlock 103B and drop off at Discharge Cvyr with Discharge conveyor unavailable.	
Pick up at Airlock 103B **COMMAND** / Drop off at BSC **REQUEST** sent to AGVCS.	
	Match Pick up at Airlock 103B **COMMAND** and Drop off at BSC **REQUEST** message with Drop off at BSC **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at BSC **REQUEST**.
When drum is stored in BSC the Pick up at BSC **COMMAND** causes the PCS to issue a Drop off at Disch Cvyr **REQUEST**	
OR	
Drum is available for pick up at Airlock 103B and drop off at NDE/NDA destination with NDE/NDA destination unavailable.	
Pick up at Airlock 103B **COMMAND** / Drop off at BSC **REQUEST** sent to AGVCS.	
	Match Pick up at Airlock 103B **COMMAND** and Drop off at BSC **REQUEST** message with Drop off at BSC **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at BSC **REQUEST**.
When drum is stored in BSC the Pick up at BSC **COMMAND** causes the PCS to issue a Drop off at NDE/NDA Destination **REQUEST**	
End of Table	

Upon completion of the transfer to the Buffer Storage Carousel, the PCS enters the drum PIN in the appropriate PCS queue based on the next destination required for the drum. The queue is maintained in a FIFO sequence unless modified manually.

12.2.9 Drum Transfers from the Buffer Storage Carousel

Any production drum that is delivered to the Buffer Storage Carousel and placed in a Destination Category "BX" queue, with the exception of the drums going to the Process Area, causing the PCS to transmit to the AGVCS a combined pick-up at BSC **COMMAND** coupled with a drop-off **REQUEST** for the appropriate location. The combined message will be transmitted upon entry of the drum PIN in the appropriate Buffer Storage Carousel queue.

As the appropriate location becomes available and provides this status to the PCS, the PCS transmits the appropriate drop-off **COMMAND** to the AGVCS. The AGVCS verifies that a pick-up **COMMAND**--drop-off **REQUEST** with a higher priority than the Buffer Storage Carousel has not been received for the drop-off location in question. If a higher priority task does not exist, the AGVCS matches the drop-off **COMMAND** with the pick-up **COMMAND--drop-off REQUEST** and request the PCS to retrieve the appropriate drum to the transfer conveyor (further delivery to carousel disabled). The PCS requests the Buffer Storage Carousel to retrieve the oldest drum in the requested category. As production drums are removed from the BSC, the PCS generates drop-off at BSC **COMMANDS** (10 maximum outstanding) and forward them to the AGVCS.

Note: The PCS has excess time to retrieve the drum prior to the AGV mating to the Buffer Storage Carousel transfer conveyor and these transport operations are low priority (3).

Messages to transfer drums to the Process Area Airlock will be generated whenever the appropriate entry gloveboxes become available. See Process Area description for drum transfers from the entry gloveboxes.

The NDE/NDA Area has a Buffer Carousel drum storage status screen on the Operator Control Station. This screen is described in Table 12-6.

Table 12-6 Buffer Storage Carousel Status

Container Class	**QC DRUMS**	**PRODUCTION DRUMS**				
Destination	QC Drum Storage in BSC	NDE	PAN	GEA	S&R Discharge Conveyor	Airlock Conveyor to Process
Destination Category	A	B				
Destination Sub Category		B1	B2	B3	B4	B5
PIN						
PIN						
PIN	----					
PIN	----					
PIN	----					
PIN	----					
PIN	----					
PIN	----					
End of Table						

Notes: 1. Total for A < 2 allows a QC drum to be stored
Total for B1 and B2... B5 < 9 allows a production drum to be stored

2. The PCS maintains the PIN queue for each subcategory in a FIFO sequence (unless modified manually), indexing the queue as drums are removed from each category.

3. The PCS provides the capability for manual deletion of entries from the queue sequence.

12.2.10 Verification Drum Transfers From the Buffer Storage Carousel

At the end of each shift, the Control Room operator will choose a "Disable Pickups at Infeed Conveyor" button on the Internal Transport Operator Control Station. The selection of this option will disable all further transmittal of messages to the AGVCS noting that drums are available for pickup on the Infeed Conveyor. The operators in the Process Area will stop the manual transfer of drums from the Process Area to the NDE/NDA Area. After the production drums in the NDE/NDA Area are processed through the NDE/NDA vaults, the NDE/NDA vaults will be "cleaned out" and available for the end of shift verification checks. As the vaults are cleaned out, the PCS provides drop-off **COMMANDS** to the AGVCS.

Operators initiate the verification drum transfers via the PCS. By choosing the Verification Drum icon on the PCS screen, the PCS retrieves the applicable drums from the BSC and generate a combined pick-up at BSC **COMMAND**--drop-off at PAN-X **REQUEST**. As the Verification Drums are retrieved from the BSC, the PCS generates a drop-off at BSC **COMMAND** and transmit it to the AGVCS to support return of the drum to the BSC when the verification assays are completed. The AGVCS matches the combined message to the previously received drop-off **COMMANDS** and place the task in the queue for completion. (Note both Verification drums will be routed to all four NDA vaults: GEA-A, PAN-A, PAN-B, GEA-B and then back to the BSC). As the vault verification checks are completed the PCS is notified, check the process route to determine the next destination and transmit the combined messages as noted above until such time as all assays are completed and the Verification Drums are returned to the BSC. The verification assays to be run at the start of the next shift will be run in the same manner with the AGVCS having retained the drop-off **COMMANDS** from the previous days operations in its memory. Once the verification and background assays at the start of the day are complete, the operator enables the Infeed Conveyor to allow the pick-up **COMMANDS**--drop-off **REQUESTS** to be generated based on the status of drums on the conveyor.

Table 12-7 Verification Drum Transfers From the Buffer Storage Carousel

PCS	AGVCS
NDE vaults ready for verification assays	
Drop off at NDA-X **COMMANDS** sent to AGVCS.	
Operator selects "Initiate Verification Assays" from OCS.	
Pick up at BSC-A **COMMAND** / Drop off at NDA-X **REQUEST** sent to AGVCS.	
When drum is removed from the BSC, the Drop off at BSC **COMMAND** is sent to the AGVCS.	
	Match Pick up at BSC **COMMAND** and Drop off at NDA-X **REQUEST** message with Drop off at NDA-X **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at NDA-X **REQUEST**.
End of Table	

12.2.11 Background Drums

At the start of each shift the NDE/NDA components will be "cleaned out" from the previous day. The Control Room operator will have chosen the "Disable Pickups at Infeed Conveyor" button on the Internal Transport Operator Control Station to support the background and verification drum checks. As the vaults are cleaned out from the end of the previous shift, the PCS provides drop-off **COMMANDS** to the AGVCS.

Once an operator determines that the Background Drum checks are ready to be initiated at the start of the day, the operator initiates the drum transfers by selecting the Internal Transport Operator Control Station icon for the Background Drum checks. Choosing the applicable function on the PCS screen will generate a PCS combined pick-up at Background Conveyor **COMMAND**--drop-off at NDA-X vault **REQUESTS** to the AGVCS which will match the message with the previously received drop-off at NDA-X **COMMANDS** and dispatch an AGV to complete the task. As drums are removed from the Background conveyors, the PCS transmits drop-off at Background Conveyor-X **COMMANDS** to the AGVCS.

The "A" background drum is only routed to the "A" vaults and the "B" background drum is only routed to the "B" vaults (NDE, PAN, or GEA). As the vault background checks are completed the PCS is notified, check the process route to determine the next destination and transmit the combined messages as noted above until such time as all assays are completed and the background drums are returned to the Background Drum Storage Conveyors.

Once the verification and background assays at the start of the day are complete, the operator enables the Infeed Conveyor to allow the pick-up **COMMANDS**--drop-off **REQUESTS** to be generated based on the status of drums on the conveyor.

Table 12-8 Background Drum Transfers From the Buffer Storage Carousel
(Typical for both "A" and "B" Background Drums)

PCS	AGVCS
NDE vaults ready for background assays	
Drop off at NDA-A **COMMANDS** sent to AGVCS.	
Operator selects "Initiate Background Assays" from OCS.	
Pick up at BDC-A **COMMAND** / Drop off at NDA-A **REQUEST** sent to AGVCS.	
When drum is removed from BDC-A, the Drop off at BDC-A **COMMAND** is sent to the AGVCS.	
	Match Pick up at BDC-A **COMMAND** and Drop off at NDA-A **REQUEST** message with Drop off at NDA-A **COMMAND** and forward as a Combined pick up and drop off **COMMAND** to AGV for action.
	Delete Drop off at NDA-A **REQUEST**.
End of Table	

12.2.12 Empty Drum Transfers to Airlock 103A

Empty drum transfers will be handled in a manual mode. The operators in the Central Control Room will verify via PCS screen or visually through the Control Room windows. When drums are required in the Process Area, the operator will verify that the drum on the end of the Empty Drum Infeed Conveyor is the appropriate type to be delivered. Once this has been verified the operator will manually select an icon to enable an Empty Drum Infeed Conveyor request to be generated and transmitted to the AGVCS. The combined message will be a pick-up at Empty Drum Infeed Conveyor **COMMAND**--drop-off at Airlock Conveyor 103A **REQUEST.** The AGVCS will match this to any outstanding drop-off Airlock Conveyor 103A **COMMANDS** (provided higher priority matches are not found) and send the task to the task queue for completion based on priority and age.

12.3 PROCESS AREA

The PCS will request waste drums to be transferred into the Waste Process Area. The destination for drums coming from either the Shipping/Receiving Area (empty drums) or the NDE/NDA Area will be delivered to the Waste Process input airlock conveyor and into the waste process area. The PCS will notify the AGVCS as to the destination of the drum. Empty drums are routed to the empty drum staging area or the LLWRWM Exit Glovebox. There are two possible lines into which RWM drums can be routed; TRU and LLW. Each line has fixed sequence processing within each processing station at which a drum may be input. The AGVCS will contain priority decision logic to obtain the optimum drum throughput within the waste process area.

12.3.1 Process Area Priority List

Waste Process area Move Priority (1 is the highest priority):

Table 12-9 Process Area AGVCS Priorities	
Priority	**Request Station**
1	Exit Glovebox Lift Tables
1	Drum Transfer from Main Glovebox to RWM Buffer Storage
1	RWM Drum Transfer from Buffer Storage to Process Gloveboxes
1	RWM Buffer Storage to RWM Gloveboxes
2	Air Lock Conveyor
2	RWM Drums to RWM Buffer Storage
3	Empty Drum Staging Conveyors
3	Empty Drums from entry gloveboxes
3	Empty Drums from RWM Carousel to gloveboxes

The PCS will provide separate pickup and delivery requests based on the status of the equipment. The AGVCS will accept the requests and attempt to match them with a complementary move associated with the priority scheme above. For example, if the PCS sends a series of pickup requests and a series of drop-off requests, the AGVCS will attempt to align the selection of pickups such that the drop-off station is where the AGVCS is to pickup another drum. This algorithm will only apply if moves are complementary. The AGVCS will not 'hold' moves waiting for the PCS to send complementary moves.

12.3.2 Drum Transfers to the RWM Carousel

The RWM Carousel contains 23 drum storage positions. The 23 positions are controlled/reserved by the PCS based on the following distribution:

- 2 positions for 85-gallon overpacks containing waste drums awaiting processing at the TRU glovebox (lift tables 202B) --- Destination Category A.
- 2 positions for 85-gallon overpacks containing waste drums awaiting processing at the LLW glovebox (lift tables 202A) --- Destination Category B.
- 2 positions for empty 85-gallon contaminated overpacks awaiting use at either the LLW Exit glovebox (lift table 202C) or the LLW RWM Exit glovebox (lift table 201D) --- Destination Category C.
- 17 positions for RWM Transfer drums (empties available for use at main glovebox (lift table 203A or B), full RWM drums awaiting sampling in the RWM gloveboxes (lift table 201C or F), or full RWM drums awaiting processing in the

RWM gloveboxes (lift table 201C or F). --- Destination Category D.

As the PCS receives P&D available messages from Process Area components it generates and forward drop-off **COMMANDS** to the AGVCS. As drums are retrieved from the RWM Carousel, the PCS transmits a drop-off at RWM Carousel **COMMAND** as appropriate to the AGVCS.

After performing required logic checks, the PCS may determine that destination of the drum to be picked up is the RWM Carousel. The PCS checks the drum's process route designation and current location to determine the drum's carousel storage. The carousel storage category is determined as noted below:

Proc Rte = 2X and current location = airlock conveyor => destin subcategory A
Proc Rte = 3X and current location = airlock conveyor => destin subcategory B
Proc Rte = 2X and current location = Lift Table 202B => destin subcategory C
Proc Rte = 3X and current location = Lift Table 202A => destin subcategory C
Proc Rte = null and current location=Lift Table 203B=>destin subcategory D2
Proc Rte = null and current location=Lift Table 203A=>destin subcategory D5
Proc Rte = null and current location=Lift Table 201C=>destin subcategory D3
Proc Rte = null and current location=Lift Table 201F=>destin subcategory D6

The PCS then issues a pick-up at Process Area component **COMMAND**--drop-off at Carousel **REQUEST** to the AGVCS. Once these messages are issued are issued, they will be matched with any complimentary drop-off **COMMANDS** and forwarded to the task queue for completion based on their age and priority.

Upon completion of the transfer to the RWM Carousel, the PCS enters the drum PIN in the appropriate PCS queue. The queue entries will be made based on the following logic:

- Drums destined for the TRU Entry glovebox will be entered in the TRU ENTRY GLOVEBOX queue (A)
- Drums destined for the LLW Entry glovebox will be entered in the LLW ENTRY GLOVEBOX queue (B)
- Empty contaminated drums are placed in the C1 queue first and the C2 queue as a default
- Drums transferred **from** the TRU RWM Transfer Port will be placed in the TRU RWM SAMPLING queue (D2)
- Drums transferred **from** the TRU RWM Entry Glovebox are placed in the TRU RWM PROCESSING queue (D3)
- Drums transferred **from** the LLW RWM Transfer Port will be placed in the LLW RWM SAMPLING queue (D5)
- Drums transferred **from** the LLW RWM Entry Glovebox are placed in the LLW RWM PROCESSING queue (D6)

12.3.3 Drum Transfers From The RWM Carousel

Any waste drum that is delivered to the RWM Carousel and placed in a Destination Category "A", or "B" queue causes the PCS to transmit a pick-up RWM Carousel **COMMAND** coupled with a drop-off **REQUEST** to the AGVCS for the appropriate location. The combined message will be transmitted upon entry of the drum PIN in the appropriate queue.

Any waste drum that is delivered to the RWM Carousel and placed in a Destination Category "C" queue causes the PCS to transmit a pick-up RWM Carousel **COMMAND** coupled with a drop-off at generic LLW_EXIT **REQUEST** to the AGVCS for the appropriate location. The combined message will be transmitted upon entry of the drum PIN in the appropriate queue. This message may be combined with a drop-off **COMMAND** for either the LLW exit glovebox (lift table 202C) or the LLW RWM exit glovebox (lift table 201D).

The AGVCS retains this task until such time as a drop-off **COMMAND** matching the drop-off **REQUEST** is received. At that time, the AGVCS verifies that a pick-up **COMMAND** with a higher priority than the RWM Carousel has not been received for the drop-off location in question. The PCS requests the Buffer Storage Carousel to retrieve the oldest drum in the requested category. As drums are removed from the BSC, the PCS generates drop-off at Carousel **COMMANDS** and forward them to the AGVCS.

Note: The PCS has excess time to retrieve the drum prior to the AGV mating to the RWM Carousel transfer conveyor and these transport operations are low priority (3).

Any waste drum that is delivered to the RWM Carousel and placed in a Destination Category "D2", "D3", "D5" or "D6" queue does not generate any action. The WRAP operator will review the status of the last drum transferred to the "D3" or "D6" queues to determine if these drums are emptied and need to be transferred to the "D1" or "D4" queues. If the drums are ready to transferred, the operator will select the drum and then select "Move to Xfer" on the RTAP display to move the drum from the "D3" or "D6" queue to the "D1" or "D4" queue, respectively. This will cause the PCS to generate a pick-up at Carousel **COMMAND** coupled with a drop-off at DESTINATION (lift table 203B for "D1" or lift table 203A for "D4") **REQUEST** to the AGVCS.

Once an operator determines that the Process Area operators are ready to receive the waste drum, the operator will change the status of the desired drum to "Ready" and then select the applicable queue from which the drum will be retrieved on the Carousel Status Screen. To initiate the transfer, the operator will choose "Issue AGV Pickup" on the PCS screen, which will cause the PCS to transmit a combined pick-up at RWM Carousel **COMMAND** - drop-off at DESTINATION **REQUEST** to the AGVCS. The AGVCS matches this drop-off **REQUEST** with a previously received drop-off **COMMAND** for this destination and adds this task to its queue. When the AGVCS is ready to complete this task, it transmits a pickup / drop-off message to the PCS to retrieve the drum. The PCS then requests the RWM Carousel to retrieve the oldest drum in the requested category with a "Ready" status.

The PCS has an RWM Carousel screen similar to that described in Table 12-10.

Table 12-10 RWM Carousel Monitoring Screen

Container Class	TRU Waste	LLW Waste	Empties	TRU RWM Transfers					LLW RWM Transfers				
Destination	TRU Entry Glovebox	LLW Entry Glovebox	LLW GEN EXT	TRU RWM Xfer Port	TRU RWM Sampling		TRU RWM Processing		LLW RWM Xfer Port	LLW RWM Sampling		LLW RWM Processing	
Destination Category	A	B	C	D									
Destination Sub Category				D1	D2	Status	D3	Status	D4	D5	Status	D6	Status
PIN													
PIN													
PIN	----	----	----										
PIN	----	----	----										
PIN	----	----	----										
PIN	----	----	----										
PIN	----	----	----										
PIN	----	----	----										

Notes: 1. Total for A1 < 2 allows a TRU drum for processing to be stored
Total for B1 < 2 allows a LLW drum for processing to be stored
Total for C1 < 2 allows an empty drum for LLW or LLW RWM Exit to be stored
Total for D1 and D2... D6 < 17 allows an RWM transfer drum to be stored

2. The PCS maintains the PIN queue for each subcategory in a FIFO sequence (unless modified manually), indexing the queue as drums are removed from each category.

3. The PCS provides the following capabilities for manual manipulation of data as follows:
   - Deletion of drums from queue sequence.
   - Updating the STATUS field for RWM drums (Status codes updated based on the schedule for sampling/processing RWM waste drums)
   - Moving drums from D3 to D1 and from D6 to D4

12.3.4 Drum Transfers From Airlock Conveyor 107-CV-09-201A/B

Once the waste drums arrive at the airlock conveyor (107-CV-09-201A or B) on the Process Area side of the airlock chain, the PCS shall check the drum process route to determine if the drum is an empty drum or a waste drum. If the drum is an empty drum the PCS shall issue a combined pick-up at airlock **COMMAND**--drop-off at empty drum conveyor (107-CV-09-203 and 204 or 201E based on process route check) **REQUEST.** This combined message will be mated to existing drop-off at 203/204 **COMMAND.**

If the drum on the airlock conveyor is a waste drum, the PCS shall determine whether it is a TRU or LLW drum. After the drum type is determined the PCS shall check the position available counter, and if there is already a drum on the way. If there is a position available, and there is no drum on the way, the PCS generates a message to transfer the drum to the glovebox else transfer the drum to the RWM Carousel. The messages will be issued as combined pick-up at airlock **COMMANDS**--drop-off at DESTINATION **REQUESTS**, which will be, matched to previously received drop-off **COMMANDS.**

12.3.5 Drum Transfers From the LLW and TRU Entry Gloveboxes

The entry gloveboxes have multiple destinations for the 85-gallon overpack drums based on the drum contamination status and the status of other drum conveyor locations. The contamination status is provided to the PCS via an Operator Interface Unit installed on the glovebox face. The PCS shall use this information to transfer the drum to either the Exit Airlock Conveyor (107-CV-09-201B or A), the LLW Exit Glovebox (107-LT-09-202C), the LLW RWM Exit Glovebox (107-LT-09-201D) or the RWM Carousel. The PCS will send a combined pick-up at LT-202X **COMMAND**--drop-off at DESTINATION **REQUEST** for these drum transfers:

- CONTAMINATED OVERPACK DRUMS

  If neither of the exit glovebox destinations is available, the PCS shall determine if any Destination Category "C" storage locations are available in the RWM Carousel. If a positive response is indicated, the PCS shall initiate a transfer from the Entry glovebox to the RWM Carousel with a combined pick-up at LT-202X **COMMAND**--drop-off at RWM Carousel **REQUEST.** This request is mated with any previously received drop-off at RWM Carousel **COMMANDS** and sent to the AGV task queue for completion.

- UNCONTAMINATED OVERPACK DRUMS

  As the PCS is notified that the entry glovebox drums are available for pickup, the PCS shall identify the drum PIN and the pick-up and drop-off (uncontaminated drums go

to the airlock) locations to support adding the drums to the PCS Process List. Empty uncontaminated overpack drums picked up at the entry gloveboxes 107-LT-09-202A and 202B will be added to a PCS listing for process route designation of "103". The PCS shall transmit a pick-up at Entry Glovebox **COMMAND**--drop-off at airlock **REQUEST** to the AGVCS. The AGVCS shall match any existing drop-off at airlock **COMMANDS** with this message and transmit the combined pick-up at Entry Glovebox--drop-off at airlock **COMMAND** to the AGV for action.

As overpack drums are removed from Entry glovebox conveyors, the PCS issues the appropriate drop-off at LT-202X **COMMANDS** to the AGVCS.

Whenever the drop-off at LT-202X **COMMANDS** are generated, the PCS shall increment the positions available counter by "1". The PCS shall also check the BSC to determine if any drums are present which are destined for the LT-202X location, which just became available. If a location exists, the PCS shall issue a pick-up at BSC **COMMAND**--drop-off at airlock 103A **REQUEST** to the AGVCS.

12.3.6 Drum Transfers From LLW and TRU RWM Transfer Ports to RWM Carousel

As drums of waste at the main glovebox RWM transfer ports (203A and B) become available for transfer, the PCS shall generate a pick-up at RWM port **COMMAND**--drop of at RWM Carousel **REQUEST** and transfer it to the AGVCS. As noted previously, when drums are removed from the RWM Carousel, the PCS shall have transmitted a drop-off at Carousel **COMMAND** to the AGVCS. The AGVCS will match the two messages and transfer a combined pick-up--drop-off **COMMAND** to the AGV for action.

12.3.7 Transfers From Empty Drum Staging Conveyors to Exit Gloveboxes

Empty 85-gallon drum transfers will be handled in the following manner. As the PCS is notified that a TRU Empty Compact Exit port 203C has a drum available for pick up, the PCS shall issue a pick up at LT-203C **COMMAND**--drop-off at Airlock conveyor 201B **REQUEST.** Upon receiving this request, the AGVCS shall verify that a previous drop-off at Airlock conveyor 201B **COMMAND** has been received as well as a pick-up at 107-09-CV-203 **COMMAND**--drop-off at LT-203C **REQUEST**. The AGVCS shall provide the logic to send the AGV (with two empty roller decks) to the 107-09-CV-203 conveyor to pick up an empty drum (Note that in this instance a complimentary drop-off at LT-203C **COMMAND** has not been transmitted from the PCS to the AGVCS). The AGVCS shall then route the AGV to the 203C conveyor to pick up the full waste drum. At this point the PCS will issue the drop-off at conveyor 203C **COMMAND,** however, the AGV shall transfer both drums to the Hold Point location at the west end of the TRU and LLW glovebox lines. The AGV will be held at this

location until receiving either the "Advance AGV" or "Release AGV" messages from the PCS. When the "Advance AGV" message is received, the AGV shall advance the AGV the distance between the drum centerlines on the roller decks (This allows drum lidding, delidding, and contamination surveys). Upon receiving the "Release AGV" message from the PCS, the AGV shall return to the glovebox exit port and offload the empty drum and then continue on to the airlock conveyor 201B to deposit the full waste drum.

Empty 55-gallon drum transfers to the storage conveyor shall cause the PCS to generate combined pick-up at 107-09-CV-204 **COMMAND**--drop-off at TRU-LT-20XX **REQUESTS**. As the TRU lift tables become available, the PCS shall issue drop-off at LT-20XX **COMMANDS** to the AGVCS to implement transfers to the gloveboxes. The AGVCS will match the **COMMANDS** to combined pick-up at CV-204 **COMMAND**--drop-off at TRU-LT-20XX **REQUESTS.** The combined **COMMANDS** will be added to the task queue and worked off based on priority and time issued.

As the PCS is notified that a TRU/TRURWM exit port (not to be confused with the RWM Transfer ports) has a drum available for pick up, the PCS shall issue a pick up at the PCS shall issue a drop-off at LT-20XX (four possible drop off locations 201A/B or 202D/E) **COMMAND**--drop-off at Airlock conveyor 201B **REQUEST.** Upon receiving this request, the AGVCS shall verify that a previous drop-off at Airlock conveyor 201B **COMMAND** has been received as well as a pick-up at 107-09-CV-204 **COMMAND**--drop-off at LT-20XX **REQUEST**. The AGVCS shall provide the logic to send the AGV (with two empty roller decks) to the 107-09-CV-204 conveyor to pick up an empty drum (Note that in this instance a complimentary drop-off at LT-20XX **COMMAND** has not been transmitted from the PCS to the AGVCS). The AGVCS shall then route the AGV to the 20XX conveyor to pick up the full waste drum. At this point the PCS will issue the drop-off at conveyor 20XX **COMMAND,** however, the AGV shall transfer both drums to the Hold Point location at the west end of the TRU and LLW glovebox lines. The AGV will be held at this location until receiving either the "Advance AGV" or "Release AGV" messages from the PCS. When the "Advance AGV" message is received, the AGV shall advance the AGV the distance between the drum centerlines on the roller decks (This allows drum lidding, delidding, and contamination surveys). Upon receiving the "Release AGV" message from the PCS, the AGV shall return to the glovebox exit port and offload the empty drum and then continue on to the airlock conveyor 201B to deposit the full waste drum.

12.3.8 Drum Transfers From the Exit Gloveboxes

The drums at the exit gloveboxes (107-LT-09-201A, 201B, 201D, 202C, 203C, 202D, and 202E) will always be transferred to the Process Area airlock conveyors 107-CV-09-201B/A and, therefore, will have combined pick-up **COMMANDS**--drop-off **REQUESTS** transmitted from the PCS to the AGVCS. The AGVCS will match the combined pick-up and drop-off

messages with drop-off at airlock **COMMANDS**, assign a priority in accordance with the specification, and add the task to the AGVCS queue (subject to constraints of paragraph 1.2.7 above). The combined **COMMANDS** will be worked off based on priority and time issued. Note: For drums picked up at the TRU exit ports 202D and 202E, a sequence similar to the sequence listed in 1.2.7 above; i.e. the AGV shall use two roller decks to pick up an empty drum from the 55-gallon empty drum storage conveyor first, proceed to the exit port, pick up the full waste drum, progress to the hold point for contamination surveys and lidding/delidding activities, be released from the hold point to deliver the empty waste drum to the glovebox and then proceed to the airlock conveyor for deposit of the full waste drum.

As these pick-up **COMMANDS** are generated by the PCS, the PCS shall also identify the drum PIN and the pick-up and drop-off locations to support adding the drums to the PCS Process List. Drums picked up from exit gloveboxes 107-LT-09-201A, 201B, 201D, 202D, and 202E for delivery to the airlock conveyor will be added to the Process List with a process route designation of "101". Drums picked up from exit gloveboxes 107-LT-09-202C and 203C (compacted waste forms) will be added to the Process List with a process route designation of "102". These process route designation are used to support transfers of the drums from airlock conveyors 104-CV-09-103B/A as noted above in the NDE/NDA AGV description.

The drums from the LLW RWM Exit Glovebox (107-LT-09-201E) will always be transferred to the LLW Entry Glovebox (107-LT-09-202A) and, therefore, will be handled with the combined pick-up **COMMANDS**--drop-off **REQUESTS** similar to any other drum transfer.

Table of Contents

13.0 AUTOMATED STACKER / RETRIEVER SYSTEM

13.1 OVERVIEW

The Automated Stacker Retriever System (ASRS) is a complete system that transports, stages and retrieves drums using a computerized control system. It is essentially a large storage rack with 54 bins that hold drums on pallets. The bins are accessed by the stacker retriever (S/R) machine, a machine that travels down the aisle on a rail to the specified bin location and deposits or picks up a pallet. On the return trip the S/R machine will set the load down at the pallet stand for the forklift operator to pick up.

A computer software program controls the S/R machine movements. The ASRS can be controlled by the operator or operated in automatic mode. The computer system records all pallet locations in order to access the proper bin immediately and provide a correct inventory of waste drums.

The ASRS interfaces with the plant through Local Control Unit (LCU) 104 program file 12 and the Plant Control System (PCS) computer.

13.2 ASRS EQUIPMENT

Storage Bins. The storage rack has 3 levels of bins, 9 on a side for a total of 54 bins. Each bin holds 1 pallet. When looking down the AS/RS isle way the racks to the right are north and the racks to the left are south. Therefore a bin location of 23S is two bins back, three bins up and on the left side. The S/R machine transfers the pallet from the pallet stand or transfer car to the specified bin. The ASRS capacity is 4250 pounds. The pallet weights approximately 347 pounds. An individual drum may weigh up to 1000 pounds. Administrative controls have been placed on the pallet load to limit the total drum weight to 3500 pounds, thereby ensuring that the 4250 pound capacity is not exceeded.

Retriever Controller is a programmable logic controller. It controls the detailed physical movement of the S/R machine.

Transfer Car and Controller is a programmable logic controller located on the West Side of the transfer car rails. It controls the detailed physical movement of the pallet transfer car. The pallet transfer car is used to shuttle pallets between the drum discharge conveyor unload to the S/R pickup point.

Materials Handling Computer (MHC) controls the overall automatic operation of the ASRS by issuing coordinated movement commands to the S/R machine and the pallet transfer car.

Marquee message display panel at both the pallet stand and the pallet transfer car display messages for interaction with WRAP facility personnel.

13.3 SYSTEM INTERFACES

The Plant Control System (PCS) is the communication link with the material handling computer. The PCS issues storage and retrieval directives to the MHC based upon information it has exchanged with the DMS.

In normal operation, WRAP personnel initiate drum storage by placing the drums on a pallet and identifying them to PCS using a bar code scanner. The PCS issues a storage directive to the MHC, and the MHC stores the pallet in the rack structure. Drum retrievals is done through the DMS when a pick list is made. This information is sent to the PCS. When the operator scans one of the retrieval scans the directive is sent to the MHC to retrieve a particular drum.

The ASRS can also be operated in a manual mode using the menu driven commands from the MHC computer. Specific loads can be requested to be stored or retrieved. The SR can also be driven in manual mode by the touch pad controls on the unit. This requires an operator to walk behind the unit as it is moving. Any moves made in this fashion are not recorded in the MHC computer.

13.4 REFERENCES

WMH-350, Section 2.1 APPENDIX D "Facility Computer System Operation, Backup, And Recovery Plan", "Automatic Stacker/Retriever System Startup, Backup, Shutdown, and Recovery"

WRP1-OP-0506 "Automated Stacker Retriever System Operation

WRAP1 Facility Operator Individualized Instruction Module, Store Containers

VI 22739 SUPP. 62 Automatic Storage/Retriever – WEBB –TRAIX

Specification 14520 Automatic Storage/Retriever System and Drum pallet assembly

This document was too large to scan as a single document; therefore, it has been divided into smaller sections.

Section 2 of 2

Document Information			
Document #	HNF-3291	**Revision**	0
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Keywords			
Projects			
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APPENDIX A

BAR CODE EQUIPMENT CONFIGURATIONS

Table of Contents

List of Tables

APPENDIX A. BAR CODE EQUIPMENT CONFIGURATIONS

A.1 ALLEN-BRADLEY 2708 WAND BAR CODE DECODER CONFIGURATION

```
NETWORK MENU:

     Workstation:          [Bar Code Terminal ID #]
     Workstation Type:     [Master (ID # 14, NT-312) or Normal
                           (ID # 13, NT-316)]
     Host Port:            COM
     Host Mode:            XON/XOFF

COMM PORT MENU:

     Com Baud Rate:        9600
     Com Char:             7 Even
     Com Stop Bits:        1
     Com CRLF:             Enabled
     Com Echo:             Disabled
     Com XON/XOFF:              Enabled

BAR CODE PARAMETERS MENU:

     3 Of 9:               Enabled
```

A.1.1 2708 - PLC Messaging (in BARCODE Submodule of LCU 103)

A.1.1.1.1 PLC to 2708 Commands

Format:	Byte Count Word 1 HEX	Source Destination Word 2 HEX	Command Words 3 - . . . ASCII
	00nn	05 0X	AA . . .

Key:

nn	-Total Bytes in message
X	-Port # that 2708 is connected to (1, 2, 3)
AA	-ASCII Command
	i.e. Display Text Message:
	mm-nn:>D TEXT
	Mm -Master 2708 node #
	Nn -Normal (slave) 2708 node # (where text is to be displayed)
	TEXT -Text to be displayed

A.1.1.1.2 2708 to PLC Messages

Format:	Words 0 - 1	Header Data
	Word 2	Master Terminal ID ASCII
	Word 3	Normal (slave) Terminal ID ASCII
	Word 7	Bar Code Data ASCII

A.2 ALLEN-BRADLEY 2755 FIXED BAR CODE DECODER CONFIGURATION

CAUTION: Changing Configuration Parameters may cause the discrete outputs to switch unexpectedly. To configure the decoder with the outputs DISABLED, press any key except the ESC key, make changes, SAVE and RESTART the decoder. If outputs are to remain ENABLED during configuration, press the ESC key to view configuration screens.

Table A-1 2755 Fixed Decoder Configuration

Main Menu

```
2755-DS1A/DS4A V2.01     Bar Code Decoder     Copyright 1992
Allen-Bradley Company, Inc.

CONFIGURATION

     1) Symbology
     2) Scanner Control, Primary Match Table, Discrete I/O
     3) Extended Match Table and Counters
     4) Aux and LCD Display Format
     5) Host Message Replacement Rules
     6) Host Message Format
     7) Host Communications
     8) Aux Terminal Data Entry

Display   System
  A) Bar Code Strings              C) Reset Status and Primary
Counters
  B) Status and Primary Counters   D) Reset Extended Match
Counters
                                E) Restart System
                                F) Select Language
                                G) Save Configuration

Press 1...8, A...G or ESC
```

Symbology

```
--SYMBOLOGY--   --------LENGTHS--------    --CHECK CHARACTERS--
 CODE 39: Yes  . . . . . . . . . . . . .  No   INCLUDE: No
   I 2/5: No   . . . . . . . . . . . . .  No   INCLUDE: No  GUARD
BARS: No
 CODABAR: No   . . . . . . . . . . . . .  No   INCLUDE: No
CODE 128: No   . . . . . . . . . . . . .     FNC1 CHAR:

   UPC-A: No   SUPPLEMENTS: None
   UPC-E: No   SUPPLEMENTS: None   EXPAND: No
```

Table A-1 2755 Fixed Decoder Configuration

```
   EAN-8: No    SUPPLEMENTS: None
  EAN-13: No    SUPPLEMENTS: None

QUIET ZONE RATIO:    Default

-------------------------------------------------------------------
--------
Commands:ESC     Change:SPACE     Cursor Control:ARROWS
-------------------------------------------------------------------
--------
```

Scanner Control

```
-------SCANNER (A) CONTROL-------
     LASER LIGHT:    Triggered
     DECODE MODE:    Package Detect
    NO-READ TIMER:   None    (msec)
 INTER-SCAN TIMER:   None    (msec)
    CAPTURE COUNT:   2
     SYMBOLS/SCAN:   1     ---------PACKAGE DETECT INPUT---------
SYMBOLS/PACKAGE:     1     (A) FILTER: No     SENSE: LO=Package
MATCH COMPLETE:      1

-------------MATCH CODE TABLE------------ ------DISCRETE I/O
[Enabled]-
1) Any     O  A  None      0
2) Any     O  A  None      0
3) Any     O  A  None      0
4) Any     O  A  None      0
5) Any     O  A  None      0
6) Any     O  A  None      0
7) Any     O  A  None      0
8) Any     O  A  None      0

-------------------------------------------------------------------
--------
Commands:ESC     Change:SPACE     Cursor Control:ARROWS
-------------------------------------------------------------------
                                 --------
```

Extended Match Tables (Not Configured)

Display Formats

```
---------AUX and LCD DISPLAY FORMAT
          DISPLAY DATA:    LCD Only
        MESSAGE FORMAT:    Host Format
           SCROLL LCD:     No
```

Table A-1 2755 Fixed Decoder Configuration

```
POSITION
     0 BAR CODE STRINGS
     0 DECODER PERFORMANCE
     0 PACKAGE COUNTER
     0 SYMBOLS NOT READ COUNTER

---PRIMARY COUNTERS---
     0 1) None
     0 2) None
     0 3) None
     0 4) None
     0 5) None
     0 6) None
     0 7) None
     0 8) None

--------------------------------------------------------------------------------
--------
Commands:ESC    Change:SPACE    Cursor Control:ARROWS
--------------------------------------------------------------------------------
--------
```

Table A-1 2755 Fixed Decoder Configuration

Host Message Replacement Rules

```
START CHARACTER: None    255
 SOURCE IDENTIFIER for (AUX):        (A):
          HEADER STRING:
        FIELD DELIMITER: None    255          NUMBER OF FIELDS IN
MESSAGE: 1
         SEND SYMBOLOGY: No                              SEND
PACKAGE COUNT: No
   SEND BAR CODE STRINGS:  Yes                     SEND DECODER
PERFORMANCE: No

      END MESSAGE: Lf
       DEFAULT NO-READ STRING: NO-READ
FIELD                                      FIELD
NUMBER  NO-READ REPLACEMENT STRING         NUMBER  NO-READ
REPLACEMENT STRING
  1  9
  2  10
  3  11
  4  12
  5  13
  6  14
  7  15
  8  16

-------------------------------------------------------------------
--------
COMMAND -- Exit:ESC  Select:RETURN  Next:SPACE
-------------------------------------------------------------------
--------
```

Host Message Format

```
---------HOST COMMUNICATIONS--------
     BAUD RATE*: 19200
     BITS/CHAR*: 8 Data 1 Stop
     PARITY*: Even
     HOST PROTOCOL*: DH485 ASCII - 1
     DEVICE ADDRESS*: 111
     ACK CHAR*: None
     NAK CHAR*: None

*Save and Restart required for these parameters to take effect.

     SCANNER A
```

1Insert actual Bar Code Decoder Terminal ID here.

Table A-1 2755 Fixed Decoder Configuration

```
     START SCAN CHAR: None     255
     STOP SCAN CHAR: None      255

     LARGE BUFFER: No
     SEND HOST MESSAGE: Immediately After Valid Package
     TRANSMISSION CHECK: None

--------------------------------------------------------------------
--------
COMMAND -- Exit:ESC  Select:RETURN  Next:SPACE
--------------------------------------------------------------------
--------
```

End of Table

A.2.1 2755 - PLC Messaging (in BARCODE Submodule of LCU 103)

A.2.1.1.1 PLC to 2755 Commands

Format:	Byte Count Word 1 HEX	Source Destination Word 2 HEX	Word 3 HEX	Command Words 4 - . . . ASCII
	00nn	05 0X	01. YY	AA

Key:

nn	-Total Bytes in message
X	-Port # that 2755 is connected to (1, 2, 3)
YY	Node # of 2755 (0 - 30)
AA	-ASCII Command
	i.e. Display Text Message:
	TMkcc*TEXT*
	k -Enable (1) / Disable (0) keyboard entry
	cc - Number of Characters in *TEXT*
	TEXT -Text to be displayed
	(If cc = 0, Default Prompt Message (Defined in AUX DATA ENTRY Menu) will be displayed.)

A.2.1.1.2 2755 - to - PLC Messages

Format:	Words 0 - 1	Header Data
	Word 2	Terminal ID (2nd Byte) HEX
	Word 3	Bar Code Data ASCII

A.3 ALLEN-BRADLEY 2760-RB MODULE CONFIGURATION

Table A-2 2760 RB Module Configuration

Main Menu

```
2760-RB                                          SERIES A  REVISION J
COPYRIGHT 1989                                ALLEN-BRADLEY COMPANY, INC.
-------------------------------------------------------------------------
-------------

1X  - CONFIGURATION PARAMETERS      2X  - IDENTIFICATION NUMBERS
3   - DEVICE PORT PROTOCOL NAMES    4DM - MATCH CODE ENTRIES
5I  - DISCRETE BYTE INPUT ENTRIES   6   - THE DATA MATRIX ENTRIES
7   - THE PASS THROUGH ENTRIES      8   - NON-VOLATILE SCRATCH
PAD AREA
9XF - RB MODULE FUNCTIONS           AX  - HARDWARE DIAGNOSTICS
BX  - SOFTWARE DIAGNOSTICS          C   - EXIT CONFIGURATION MODE

WHERE X (0 TO 7) AND D (1 TO 3) ARE PORT NUMBERS WHICH ARE
DEFINED BELOW :

0 - RB CMMND PRCSS  2 - SERIAL PORT 2  4 - CONFIG PORT     6 -
I/O RACK SLT 1
1 - SERIAL PORT 1   3 - SERIAL PORT 3  5 - I/O RACK SLT 0   7 -
RESERVED

WHERE F (A TO E) ARE FUNCTIONS THAT RB CAN PERFORM WHICH ARE
DEFINED BELOW :

A - RESET   B - SET DEFAULTS   C - FLUSH   D - INITIALIZE   E -
CLEAR DIAGS

WHERE M (A TO T) AND I (A TO H) ARE ENTRY NUMBERS FOR THE
SELECTION MADE ABOVE.
```

Table A-2 2760 RB Module Configuration

Configure Channel 2 (Select "12" from Main Menu)

```
SLOT TIME (NO. CHARS) (DEC 0...255) = 7.
INTER-CHAR TIME (NO. CHARS) (DEC 0...255) = 7.
IDLE TIME (NO. CHARS) (DEC 0...255) = 3.
RETRIES (DEC 0...255) = 3.
19200 BITS PER SECOND (YES/NO) = YES.
BCD NODE NUMBERS (ENABLE/DISABLE) = ENABLE.
BYTE SWAPPING (ENABLE/DISABLE) = ENABLE.
RECEIVE MATRIXING (ENABLE/DISABLE) = DISABLE.
MATRIX ADDRESS (HEX 0...ffff) = 0.
RE-ESTABLISH FREQUENCY (DEC 0...255) = 5.
POLL FREQUENCY/DESTINATION[0] (HEX 0...ffff) = 5.
POLL FREQUENCY/DESTINATION[1] (HEX 0...ffff) = 5.
POLL FREQUENCY/DESTINATION[2] (HEX 0...ffff) = 5.
     .
     .
     .
POLL FREQUENCY/DESTINATION[12] (HEX 0...ffff) = 105.
POLL FREQUENCY/DESTINATION[13] (HEX 0...ffff) = 5.
POLL FREQUENCY/DESTINATION[14] (HEX 0...ffff) = 5.
POLL FREQUENCY/DESTINATION[15] (HEX 0...ffff) = 105.
POLL FREQUENCY/DESTINATION[16] (HEX 0...ffff) = 105.
POLL FREQUENCY/DESTINATION[17] (HEX 0...ffff) = 105.
POLL FREQUENCY/DESTINATION[18] (HEX 0...ffff) = 105.
POLL FREQUENCY/DESTINATION[19] (HEX 0...ffff) = 105.
     .
     .
     .
POLL FREQUENCY/DESTINATION[30] (HEX 0...ffff) = 5.
MATRX SEND DESTINATIONS [RB SRC][0] (DEC 0...255) = 255.
MATRX SEND DESTINATIONS [RB SRC][1] (DEC 0...255) = 255.
MATRX SEND DESTINATIONS [RB SRC][2] (DEC 0...255) = 255.
MATRX SEND DESTINATIONS [RB SRC][3] (DEC 0...255) = 255.
MATRX SEND DESTINATIONS [RB SRC][4] (DEC 0...255) = 255.
MATRX SEND DESTINATIONS [RB SRC][5] (DEC 0...255) = 255.
MATRX SEND DESTINATIONS [RB SRC][6] (DEC 0...255) = 255.
MATRX SEND DESTINATIONS [RB SRC][7] (DEC 0...255) = 255.
DATA LSAP[0] (DEC 0...255) = 128.
DATA LSAP[1] (DEC 0...255) = 128.
```

Identify Channel 2 (Select "22" from Main Menu)

```
RS485 LAN 2755-DM6 ASCII MODE 3, 0h (YES/NO) = YES.
```

Identify Device Port Protocol Names (Select "3" from Main Menu)

Table A-2 2760 RB Module Configuration

```
PORT 1 = COPYRIGHT 1989  ALLEN-BRADLEY COMPANY, INC.,
2760-SFC2 LAN, SERIES A, REVISION B     (YES/NO) = YES.

PORT 2 = COPYRIGHT 1989  ALLEN-BRADLEY COMPANY, INC.,
2760-SFC2 LAN, SERIES A, REVISION B     (YES/NO) = YES.

PORT 3 = COPYRIGHT 1989  ALLEN-BRADLEY COMPANY, INC.,
2760-SFC2 DT,  SERIES A, REVISION B     (YES/NO) = YES.
```

Configure Channel 3 (Select "13" from Main Menu)

```
MODEM CONTROL (ENABLE/DISABLE) = DISABLE.
9600 BITS PER SECOND (YES/NO) = YES.
7 BITS EVEN PARITY (YES/NO) = YES.
XON/XOFF (ENABLE/DISABLE) = ENABLE.
RS232 (YES/NO) = YES.
RECEIVE MATRIXING (ENABLE/DISABLE) = ENABLE.
BYTE SWAPPING (ENABLE/DISABLE) = ENABLE.
BINARY DATA NO CONVERSIONS (YES/NO) = YES.
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE.
HEADER BYTE LENGTH (DEC 0...4) = 0.
HEADER DATA[0] (HEX 0...ff) = 0.
HEADER DATA[1] (HEX 0...ff) = 0.
HEADER DATA[2] (HEX 0...ff) = 0.
HEADER DATA[3] (HEX 0...ff) = 0.
TRAILER BYTE LENGTH (DEC 0...4) = 2.
TRAILER DATA[0] (HEX 0...ff) = a.
TRAILER DATA[1] (HEX 0...ff) = d.
TRAILER DATA[2] (HEX 0...ff) = 0.
TRAILER DATA[3] (HEX 0...ff) = 0.
MAX DATA BYTE LENGTH (DEC 0...124) = 0.
MIN DATA BYTE LENGTH (DEC 0...124) = 30.
PAD CHARACTER (HEX 0...ff) = d.
BIG MESSAGES (ENABLE/DISABLE) = DISABLE.
DEFAULT DESTINATION (DEC 0...255) = 5.
DEFAULT SOURCE (DEC 0...255) = 255.
DEFAULT ADDRESS (HEX 0...ffff) = 200.
SETUP TIMEOUT/SECS (DEC 0...255) = 0.
SETUP BYTE LENGTH (DEC 0...78) = 0.
SETUP DATA[0] (HEX 0...ff) = 0.
SETUP DATA[1] (HEX 0...ff) = 0.
SETUP DATA[2] (HEX 0...ff) = 0.
      .
      .
      .
SETUP DATA[77] (HEX 0...ff) = 0.
```

Identify Channel 3 (Select "23" from Main Menu)

Table A-2 2760 RB Module Configuration

```
DUMB TERM. UNSPECIFIED PROTOCOL, 13fh (YES/NO) = YES.


2760-RB                                  SERIES A  REVISION J
COPYRIGHT 1989                           ALLEN-BRADLEY COMPANY, INC.
```

Table A-2 2760 RB Module Configuration

Configure Channel 4 (Select "14" from Main Menu)

```
XON/XOFF PROTOCOL (ENABLE/DISABLE) = DISABLE.
BYTE SWAPPING ON OUTPUT ONLY (ENABLE/DISABLE) = DISABLE.
BINARY DATA NO CONVERSIONS (YES/NO) = YES.
HDR/TLR ON OUTPUT (ENABLE/DISABLE) = ENABLE.
HEADER BYTE LENGTH (DEC 0...4) = 0.
HEADER DATA[0] (HEX 0...ff) = 0.
HEADER DATA[1] (HEX 0...ff) = 0.
HEADER DATA[2] (HEX 0...ff) = 0.
HEADER DATA[3] (HEX 0...ff) = 0.
TRAILER BYTE LENGTH (DEC 0...4) = 1.
TRAILER DATA[0] (HEX 0...ff) = d.
TRAILER DATA[1] (HEX 0...ff) = 0.
TRAILER DATA[2] (HEX 0...ff) = 0.
TRAILER DATA[3] (HEX 0...ff) = 0.
MAX DATA LENGTH IN (DEC 0...124) = 124.
MIN DATA LENGTH OUT (DEC 0...255) = 0.
PAD CHARACTER (HEX 0...ff) = 0.
DEFAULT RB DESTINATION (HEX 0...ff) = 5.
DEFAULT RB SOURCE (HEX 0...ff) = 4.
DEFAULT RB ADDRESS (HEX 0...ffff) = 0.
SETUP TIMEOUT/SECS (DEC 0...255) = 0.
SETUP BYTE LENGTH (DEC 0...78) = 26.
SETUP DATA[0] (HEX 0...ff) = d.
SETUP DATA[1] (HEX 0...ff) = a.
SETUP DATA[2] (HEX 0...ff) = a.
SETUP DATA[3] (HEX 0...ff) = a.
SETUP DATA[4] (HEX 0...ff) = a.
      .
      .
      .
SETUP DATA[25] (HEX 0...ff) = a.
SETUP DATA[26] (HEX 0...ff) = 0.
SETUP DATA[27] (HEX 0...ff) = 0.
      .
      .
      .
SETUP DATA[77] (HEX 0...ff) = 0.


2760-RB                                SERIES A  REVISION J
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```

Identify Channel 4 (Select "24" from Main Menu)

```
2760-RB MODULE CONFIGURATION ONLY, 150fh (YES/NO) = YES.
```

Table A-2 2760 RB Module Configuration
End of Table

A.3.1 Allen Bradley 2760 RB module - PLC Messaging

A.3.1.1.1 PLC to 2760 Commands

Format:	Byte Count Word 1 HEX	Source Dest. Word 2 HEX	Status Cmd Word 3 HEX	Transmission # Word 4 ASCII	Command Address Word 5
	0010	05 00	00 08	0001	1X0Y

Key:

X Port # (0, 1, 2, 3, 4)

Y Command:
- 2 Reset Port
- 4 - Flush Port
- 5 - Clear Port Diagnostics

A.4 TEKLOGIX 7025-ILR RF BAR CODE SCANNER CONFIGURATION

Table A-3 Teklogix 7025 Bar Code Scanner Configuration

Radio Parameters Menu			
Narrow Band Synthesized Spread Spectrum:			
	Channel:	Chan #	1
		Power-up chan	N
		Voice Chan	0
		Chan1 enable	Y
		Chan2 enable	N
		Chan3 enable	Y
		Chan4 enable	N
		Chan5 enable	Y
		Chan6 enable	N
		Chan7 enable	N
		Chan-auto: Next ch-auto	1
		Next ch-auto	3
		Next ch-auto	5
		Next ch-auto	0
		Next ch-auto	0
		Next ch-auto	0
		Next ch-auto	0
	Contants:	Power	Hi
		Baud Rate	122k
		Sync Delay	4
		TX on Time	10
		Poll Tmout	3
		PwrON time	0
		PwrOFF time	0
	Voice:	Speaker low	Y
		Speaker med	Y
	Wlan		N
	Tests:	Online	Y
		Rcv Once	N
		Rcv Test	N
		Xmt Test	N
		Xmt Long	N
		Xmt -Mod	N
		Stop	N
		Tst Chan	0
		Pattern	0
		Msg Size	30
		Xmit Time	30

Table A-3 Teklogix 7025 Bar Code Scanner Configuration

Barcode Usage Parameters Menu		
Code 39		Y
	Full Ascii	Y
	Mod 43 Chk	N
	Mod 10 Chk	N
	Include Chk	N
	AIAG Strip	N
	Err Accept	N
Size/Chars:	Field Size	0
	Prefix Char	0
	Suffix Char	13
	Strip 1st Char	N
Code 128	N	
.	.	
.	.	
.	.	
D 2 of 5	N	
Options:	Translate:	(No Translations)
	Verify	0
	Security	30
	Large	Y
	Beam Lockout	N
	Long Scan	N

Table A-3 Teklogix 7025 Bar Code Scanner Configuration

View Manager Parameters Menu		
Shut-down		10
Backlight		10
LCD change		N
LCD Contrast		5
Block Cursor		Y
ESC protect		Y
'.' --> ','		N
Display shift		Y
Use increment		N
X-increment		5
Y-increment		5
Beeper defaults:	kb-klik time	1
	kb-klik tone	61
	kb-err time	10
	kb-err tone	60
Scanner Trigger:	Timeout	0
	Character	0
	Scan Indication	Y
	Scan Results	Y
Function Lock:	Summary (Enter)	N
	.	.
	.	.
	.	.
	View Mode	N
Select Scanner Parameters Menu		
Scanner		Y
Wand		N
Custom		N
Global Macros Parameters Menu		
(None)		

Table A-3 Teklogix 7025 Bar Code Scanner Configuration

Character Set Parameters Menu		
National:	US ASCII	Y
	British	N
	.	.
	.	.
	.	.
	Other Sets	N
Extended:	IBM PC	Y
	DEC Multinat'l	N
	ISO Latin Nr 1	n
	IBM 5250 Multi	N
	Custom	N
Custom ASCII:	(No Changes)	
Custom Extended:	(No Changes)	
CTRL F1 - F6 keys:	(No Changes)	
Application Parameters Menu		
Name: #1	ansi	
Title: #1	TERMn	n = Scanner Terminal ID # (1 - 6)
Ports Set-up Parameters Menu		
Console:	Select	Disable
	(Not Applicable)	
Serial:	Select	Disable
	(Not Applicable)	

Table A-3 Teklogix 7025 Bar Code Scanner Configuration

TERMn Parameters Menu: n = Scanner Terminal ID # (1 - 6)			
Terminal #			n
Screen:	# of pages		2
	# of rows		16
	# of columns		32
	Default font		16x3
	Video:	Bold	NONE
		Blink	BLNK
		Reverse	REV
		Underline	ULIN
Xmit Modes:	Xmit Count		3
	Xmit Wait		0
	Dev. Attrib		<- [? 62 ;1;2;6e
	7-bit		Y
	Block Mode	Kbd lock	N
		...	...
		TTM.	No
			.
			N
	EOL chars		(None)
	EOB chars		(None)
Kbd Modes:	Arrow mode		cursor
	Echo mode		Smart
	DEL key		DEL
	Xmit Enter		N
	Insert		N
	Newline		N
	Disable kbd		N
Edit Modes:	Auto wrap		N
	Erasure mode		N
	Tab Stop mode		N
	Edit extent		Dis
	Disp controls		N
Serial:	Async In		N
	Start		0
	End		0

End of Table

A.5 TEKLOGIX 9130 RADIO LINK CONTROLLER CONFIGURATION

Dip-switch Settings:	1	2	3	4	5	6	7	8
NY-104	On	On	Off	Off	Off	Off	Off	Off
		Channel 3			Base station mode, online			
NY-105	On	Off	Off	Off	Off	Off	Off	Off
		Channel 1			Base station mode, online			
NY-306	On	Off	On	Off	Off	Off	Off	Off
		Channel 5			Base station mode, online			

A.6 TEKLOGIX 9200 NETWORK CONTROLLER CONFIGURATION

Table A-4 Teklogix 9200 Controller Configuration

Terminals = 16	Hosts = 1	Base Stations = 3	RRM Groups = 0	
Host 1 Submenu:				
Protocol = TCP/IP	Emulation = ANSI	Name = NY-106		
Port = E1	Speed = 19200	Terminals: 1- 16		
North American				
Base Station 1 Submenu:				
Port = M2	Speed = 122000	Terminals: 1- 16		
Poll Windows: 4	Size = 8	Message Mode: Factor = 0	Limit = 4	Retries = 3
Message Size = 100				
Poll Period = 10	Poll Timeout = 2	CRC = YES	Auto Startup = YES	
Full Duplex = NO				
Base Station 2 Submenu:				
Port = M3	Speed = 122000	Terminals: 1- 16		
Poll Windows: 4	Size = 8	Message Mode: Factor = 0	Limit = 4	Retries = 3
Message Size = 100				
Poll Period = 10	Poll Timeout = 2	CRC = YES	Auto Startup = YES	
Full Duplex = NO				

Table A-4 Teklogix 9200 Controller Configuration

Base Station 3 Submenu:

Port = M4	Speed = 122000	Terminals: 1- 16		
Poll Windows: 4	Size = 8	Message Mode: Factor = 0	Limit = 4	Retries = 3
Message Size = 100				
Poll Period = 10	Poll Timeout = 2	CRC = YES	Auto Startup = YES	
Full Duplex = NO				

Table A-4 Teklogix 9200 Controller Configuration

Ports Submenu:				
M2 = Base Station 1		Speed = 122000		
M3 = Base Station 2		Speed = 122000		
M4 = Base Station 3		Speed = 122000		
Console Speed = 19200				
Screen Features Submenu:				
Alarm = No	Clear = No	Procedures = No	Passthru= No	Transmit Line = 0
DIAG = 0				
Visible Match - 0	Hidden Match = 0	Barcode Input Only = 0	Serial I/O = 0	
Host Print = NO	Remote Print = NO	Print Line = 0	Print Formlength = 0	
Entry Line = 0	Command Region = 0,0 - 0,0			
Local = NO	Queing = NO			
Radio Link Features Submenu:				
Poll ID = 0	Terminal Offline:	Timeout = 60	Percent = 75	
Pages = 8	Field Overhead = 5			
End of Table				

Appendix B
Local Control Unit 101
Memory Maps

Appendix B
Local Control Unit 101
Memory Maps

Table of Contents

LCU 101 File 10 PLC Memory Map - Receiving

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Receiving Dock									
PLC I/O									
	PORTABLE BAR CODE SCANNER								
	PLC TO PCS DISCONNECT BAR CODE LINK - TERMINAL #1						N101	476	0
	PLC TO PCS DISCONNECT BAR CODE LINK - TERMINAL #2						N101	476	1
	PCS TO PLC BAR CODE (BRCTS) HANDSHAKING BIT						N100	476	0
	PCS TO PLC BAR CODE (BRCTS2) HANDSHAKING BIT						N100	476	1
	PCS TO PLC BAR CODE COMMAND REGISTER						N100	0-15	
	TEMPORARY INTERNAL DRUM PIN DATA TABLE								
	PLC TO PCS BAR CODE TERMINAL ID						N101	218	
	PLC TO PCS BAR CODE MESSAGE LENGTH						N101	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)						N101	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)						N101	236-251	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)						N101	252-267	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)						N101	268-283	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)						N101	284-299	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)						N101	300-315	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)						N101	316-331	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)						N101	332-347	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)						N101	348-363	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)						N101	364-379	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)						N101	380-395	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)						N101	396-411	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)						N101	412-427	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)						N101	428-443	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)						N101	444-459	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)						N101	460-475	
	BAR CODE MESSAGE RECEIVED			N10	3	10			
	BAR CODE IS A CONTAINER PIN			N10	3	11			
	"CNCL PREV READ" BAR CODE RECEIVED BY TERMINAL #1			N10	3	12			
	"END" BAR CODE RECEIVED BY TERMINAL #1			N10	3	13			
	"CANCEL OPERATION" BAR CODE RECEIVED BY TERMINAL #1			N10	3	14			
	"CNCL PREV READ" BAR CODE RECEIVED BY TERMINAL #2			N10	2	12			
	"END" BAR CODE RECEIVED BY TERMINAL #2			N10	2	13			
	"CANCEL OPERATION" BAR CODE RECEIVED BY TERMINAL #2			N10	2	14			
	TERMINAL #1 LOCATION = RECDCK			N10	4	8			
	TERMINAL #1 LOCATION = EMPSTR			N10	4	9			
	TERMINAL #1 LOCATION = INFDCVYRW			N10	4	11			

LCU 101 File 10 PLC Memory Map - Receiving

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	TERMINAL #2 LOCATION = RECDCK			N10	5	8			
	TERMINAL #2 LOCATION = EMPSTR			N10	5	9			
	TERMINAL #2 LOCATION = INFDCVYRW			N10	5	11			
	RECEIVING DOCK DRUM TEMPORARY PIN TABLE			N108	408-807				
	EMPTY DRUM STORAGE DRUM PIN TABLE			N108	8-327				
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N10	0	0			
5.3.1	**SEND WASTE CONTAINER LOCATION UPDATE MSG.**	NETCOM		N10	0	1			
	NUMBER CONTAINERS			C5	1/12	ACC			
	CONTAINER IDENTIFICATIONS			N107	0-399				
PCS To PLC									
	PCS TO PLC MESSAGE DESTINATION = RECEIVING			B3		4			
5.4.1	**WASTE CONTAINER LOCATION UPDATE (DRUMS ACCEPTED) MESSAG**	NETCOM		N10	1	0			
	CONTAINER LOCATION			N10	8				
	NUMBER CONTAINERS			N10	9				
	CONTAINER IDENTIFICATIONS			N10	10-409				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
	FISSILE MATERIAL INVENTORY LIMIT VIOLATION STATUS			N109	0	0-1	N101	200	0-1
Drum Infeed Conveyor A									
PLC I/O									
05-HS-106A	**DRUM INFEED CONVEYOR A IN REMOTE**	DI	I:013/14				N95	013	12
05-HS-106B/ST	**DRUM INFEED CONVEYOR A START PUSH BUTTON**	DI	I:013/15				N95	013	13
05-HS-106B/SP	**DRUM INFEED CONVEYOR A STOP PUSH BUTTON**	DI	I:013/16				N95	013	14
05-HS-106C	**DRUM INFEED CONVEYOR A MOTOR CLUTCH SOLENOID IN REMOTE**	DI	I:013/17				N95	013	15
05-XS-106A/B	**DRUM INFEED CONVEYOR A ROPE SWITCH EMERGENCY STOP**	DI	I:014/00				N95	014	00
05-ZS-106	**DRUM IN READY POSITION ON DRUM INFEED CONVEYOR A**	DI	I:014/01				N95	014	01
CV-05-101/S	**DRUM INFEED CONVEYOR A RUNNING**	DI	I:014/02				N95	014	02
05-ZEV-106	**DRUM INFEED CONVEYOR A INDEX CLUTCH SOLENOID**	DO	O:022/16				N95	022	14
CV-05-101A/F	**DRUM INFEED CONVEYOR A RUN**	DO	O:022/17				N95	022	15
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
CV-05-101A	**DRUM INFEED CONVEYOR A FAILED STATUS**			N109	0	2-3	N101	200	2-3
05-XS-106A/B	**DRUM INFEED CONVEYOR A ROPE SWITCH PULLED STATUS**			N109	0	4-5	N101	200	4-5
Drum Scale Conveyor A									
PLC I/O									
05-HS-107B	**CONVEYOR INDEX PUSH BUTTON**	DI	I:015/07				N95	015	07
05-HS-107A	**DRUM SCALE CONVEYOR A IN REMOTE**	DI	I:015/06				N95	015	06
05-XS-107A/B	**DRUM SCALE CONVEYOR A ROPE SWITCH EMERGENCY STOP**	DI	I:015/10				N95	015	8

LCU 101 File 10 PLC Memory Map - Receiving

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
05-ZS-107	**DRUM ON DRUM SCALE CONVEYOR A**	DI	I:015/11				N95	015	9
CV-05-103A/S	**DRUM SCALE CONVEYOR A RUNNING**	DI	I:015/12				N95	015	10
05-XL-107	**INFORMATION RECEIVED INDICATING LIGHT**	DO	O:023/10				N95	023	8
CV-05-103A/F	**DRUM SCALE CONVEYOR A RUN**	DO	O:023/11				N95	023	9
05-WIT-107	**DRUM WEIGHT - DRUM SCALE CONVEYOR A**	RS-232		N108	816-817		N104	0-2	
12-NT-102	**DRUM SCALE CONVEYOR A BAR CODE SCANNER**	RS-485							
	INTERNAL DRUM PIN DATA TABLE - PIN			N108	808-815				
	INTERNAL DRUM PIN DATA TABLE - WEIGHT			N108	816-817				
	INTERNAL DRUM PIN DATA TABLE - ROUTE			N108	818-819				
	INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N108	820				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)						N101	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)						N101	236-251	
PLC To PCS									
5.3.2	**WASTE CONTAINER LOCATION UPDATE WITH CONTAINER WEIGHT**	NETCOM		N10	0	3			
	NUMBER CONTAINERS			C5	1/12	ACC			
	CONTAINER IDENTIFICATIONS			N108	350-357				
	DRUM WEIGHT			N108	0-1				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
CV-05-103B	**DRUM SCALE CONVEYOR A FAILED STATUS**			N109	0	6-7	N101	200	6-7
05-XS-107A/B	**DRUM SCALE CONVEYOR A ROPE SWITCH PULLED STATUS**			N109	0	8-9	N101	200	8-9
	DRUM SCALE A DRUM PIN MISMATCH			N109	0	12			
	DRUM SCALE A DRUM WEIGHT OUT OF BOUNDS			N109	0	10			
END OF LCU 101 FILE 10 MEMORY MAP									

LCU 101 File 11 PLC Memory Map - Shipping

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum Scale Conveyor B									
PLC I/O									
05-HS-110A	**DRUM SCALE CONVEYOR B IN REMOTE**	DI	I:015/14				N95	015	12
05-HS-110B	**INDEX PUSH BUTTON**	DI	I:015/15				N95	015	13
05-XS-110A/B	**DRUM SCALE CONVEYOR B ROPE SWITCH EMERGENCY STOP**	DI	I:015/16				N95	015	14
05-ZS-110B	**DRUM ON DRUM SCALE CONVEYOR B**	DI	I:015/17				N95	015	15
CV-05-103B/S	**DRUM SCALE CONVEYOR B RUNNING**	DI	I:016/00				N95	016	00
CV-05-103B	**DRUM SCALE CONVEYOR RUN**	DO	O:023/12				N95	023	10
05-XL-110	**INFORMATION RECEIVED INDICATING LIGHT**	DO	O:023/13				N95	023	11
05-WIT-110	**DRUM WEIGHT**	RS-232		N118	1-2		N115	0-2	
	PORTABLE BAR CODE SCANNER	RS-485							
	PLC TO PCS DISCONNECT BAR CODE LINK TERMINAL #1						N111	476	0
	PLC TO PCS DISCONNECT BAR CODE LINK TERMINAL #2						N111	476	1
	PCS TO PLC BAR CODE (BCTS) HANDSHAKING BIT						N110	476	0
	PCS TO PLC BAR CODE (BCTS2) HANDSHAKING BIT						N110	476	1
	PCS TO PLC BAR CODE COMMAND REGISTER						N110	0-15	
	TEMPORARY INTERNAL DRUM PIN DATA TABLE								
	PLC TO PCS BAR CODE TERMINAL ID						N111	218	
	PLC TO PCS BAR CODE MESSAGE LENGTH						N111	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)						N111	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)						N111	236-251	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)						N111	252-267	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)						N111	268-283	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)						N111	284-299	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)						N111	300-315	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)						N111	316-331	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)						N111	332-347	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)						N111	348-363	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)						N111	364-379	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)						N111	380-395	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)						N111	396-411	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)						N111	412-427	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)						N111	428-443	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)						N111	444-459	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)						N111	460-475	
	BAR CODE MESSAGE RECEIVED			N11	3	10			
	BAR CODE IS A CONTAINER PIN			N11	3	11			
	"CNCL PREV READ" BAR CODE RECEIVED BY TERMINAL #1			N11	3	12			

LCU 101 File 11 PLC Memory Map - Shipping

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	"END" BAR CODE RECEIVED BY TERMINAL #1			N11	3	13			
	"CANCEL OPERATION" BAR CODE RECEIVED BY TERMINAL #1			N11	3	14			
	"TRU ASSY COMPLETE" BAR CODE RECEIVED BY TERMINAL #1			N11	4	3			
	"CNCL PREV READ" BAR CODE RECEIVED BY TERMINAL #2			N11	2	12			
	"END" BAR CODE RECEIVED BY TERMINAL #2			N11	2	13			
	"CANCEL OPERATION" BAR CODE RECEIVED BY TERMINAL #2			N11	2	14			
	"TRU ASSY COMPLETE" BAR CODE RECEIVED BY TERMINAL #2			N11	5	3			
	TERMINAL #1 LOCATION = DISCHCVRW			N11	4	8			
	TERMINAL #1 LOCATION = SHPDCK			N11	4	9			
	TERMINAL #1 LOCATION = SWBSTR			N11	4	10			
	TERMINAL #1 LOCATION = SHIPEMPSTR			N11	4	11			
	TERMINAL #1 LOCATION = ACCVYR			N11	4	12			
	TERMINAL #1 LOCATION = TRUBAY			N11	4	13			
	TERMINAL #2 LOCATION = DISCHCVRW			N11	5	8			
	TERMINAL #2 LOCATION = SHPDCK			N11	5	9			
	TERMINAL #2 LOCATION = SWBSTR			N11	5	10			
	TERMINAL #2 LOCATION = SHIPEMPSTR			N11	5	11			
	TERMINAL #2 LOCATION = ACCVYR			N11	5	12			
	TERMINAL #2 LOCATION = TRUBAY			N11	5	13			
	PLC TO RTAP DRUM PIN COMPARE BUFFER						N111	8-15	
	RTAP TO PLC DRUM PIN COMPARE RESULT REGISTER						N110	20	
	TRUBAY DRUM PIN TABLE			N117	8-31				
	SHIPPING DOCK DRUM PIN TABLE			N117	32-431				
	SWB DRUM PIN TABLE			N117	440-519				
	EMPTY DRUM SHIPPING AREA DRUM PIN TABLE			N117	530-849				
	TRUPACT ASSEMBLY DRUM PIN TABLE			N116	8-119				
	TRUPACT ACCUMULATION CONVEYOR DRUM PIN TABLE			N116	120-183				
	DRUM SCALE B DRUM PIN TABLE - PIN			N118	408-415				
	DRUM SCALE B DRUM PIN TABLE - WEIGHT			N118	0				
	DRUM SCALE B DRUM PIN TABLE - ROUTE			N118	1-2				
	DRUM SCALE B DRUM PIN TABLE - STATUS			N118	3				
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N11	0	0			
5.3.1	**SEND WASTE CONTAINER LOCATION UPDATE MESSAGE**	NETCOM		N11	0	1			
	NUMBER CONTAINERS			C5	0/11	ACC			
	CONTAINER IDENTIFICATIONS			N118	8-407				
5.3.2	**SEND WASTE CONTAINER LOCATION UPDATE WITH CONT. WEIGHT MESS**	NETCOM		N11	0	2			
	NUMBER CONTAINERS			C5	0/11	ACC			
	CONTAINER IDENTIFICATIONS			N118	410				

LCU 101 File 11 PLC Memory Map - Shipping

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	DRUM WEIGHT			N118	0-1				
5.3.26	**TRUPACT ASSY COMPLETE**	NETCOM		N11	0	4			
	TRUPACT CONTAINER IDENTIFICATION			N11	435				
PCS To PLC									
	PCS TO PLC MESSAGE DESTINATION = SHIPPING			B3		5			
5.4.1	**WASTE CONTAINER LOCATION UPDATE**	NETCOM		N11	1	0			
	CONTAINER LOCATION			N11	8				
	NUMBER CONTAINERS			N11	9				
	CONTAINER IDENTIFICATIONS			N11	10-409				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
05-ZS-110A/B	**DRUM SCALE CONVEYOR B ROPE SWITCH PULLED STATUS**			N119	0	0-1			
CV-05-103B	**DRUM SCALE CONVEYOR B FAILED STATUS**			N119	0	2-3			
	DRUM SCALE B DRUM PIN MISMATCH			N119	0	4			
	DRUM SCALE B WEIGHT OUT OF BOUNDS			N119	0	6			
END OF LCU 101 FILE 11 MEMORY MAP									

LCU 101 File 14 PLC Memory Map - Drum Infeed Conveyor B

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum Infeed Conveyor B									
PLC I/O									
05-HS-107B	CONVEYOR INDEX PUSH BUTTON	DI	I:015/07	N95	015	07			
05-HS-108A	DRUM INFEED CONVEYOR B IN REMOTE	DI	I:014/04	N95	014	04			
05-HS-108B	DRUM INFEED CONVEYOR B MOTOR CLUTCH SOLENOID IN REMOTE	DI	I:014/05	N95	014	05			
05-XS-108A/B	DRUM INFEED CONVEYOR B ROPE SWITCH EMERGENCY STOP	DI	I:014/06	N95	014	06			
05-ZS-108A	DRUM INFEED CONVEYOR B FULL	DI	I:014/07	N95	014	07			
05-ZS-108B	DRUM IN READY POSITION ON DRUM INFEED CONVEYOR B	DI	I:014/10	N95	014	8			
05-ZS-108C	AGV HANDSHAKE INPUT	DI	I:014/11	N95	014	9			
CV-05-101B/S	DRUM INFEED CONVEYOR B RUNNING	DI	I:014/13	N95	014	11			
05-ZEV-108	DRUM INFEED CONVEYOR B INDEX CLUTCH SOLENOID	DO	O:023/00	N95	023	00			
05-ZY-108C	AGV HANDSHAKE OUTPUT	DO	O:023/01	N95	023	01			
CV-05-101B/F	DRUM INFEED CONVEYOR B RUN	DO	O:023/03	N95	023	03			
	RTAP_TO_PLC DISABLE DRUM PICK-UPS			N140	0	0			
	INFEED CONV B DRUM AT POSITION 1			N141	0	0			
	INFEED CONV B DRUM AT POSITION 2			N141	0	1			
	INFEED CONV B DRUM AT POSITION 3			N141	0	2			
	INFEED CONV B DRUM AT POSITION 4			N141	0	3			
	INFEED CONV B DRUM AT POSITION 1 PIN			N141	1-8				
	INFEED CONV B DRUM AT POSITION 2 PIN			N141	9-16				
	INFEED CONV B DRUM AT POSITION 3 PIN			N141	17-24				
	INFEED CONV B DRUM AT POSITION 4 PIN			N141	25-32				
	INFEED CONV B DRUM AT POSITION 1 WEIGHT			N141	33				
	INFEED CONV B DRUM AT POSITION 2 WEIGHT			N141	34				
	INFEED CONV B DRUM AT POSITION 3 WEIGHT			N141	35				
	INFEED CONV B DRUM AT POSITION 4 WEIGHT			N141	36				
	INFEED CONV B DRUM AT POSITION 1 ROUTE			N141	37-38				
	INFEED CONV B DRUM AT POSITION 2 ROUTE			N141	39-40				
	INFEED CONV B DRUM AT POSITION 3 ROUTE			N141	41-42				
	INFEED CONV B DRUM AT POSITION 4 ROUTE			N141	43-44				
	INFEED CONV B DRUM AT POSITION 1 STATUS			N141	45				
	INFEED CONV B DRUM AT POSITION 2 STATUS			N141	46				
	INFEED CONV B DRUM AT POSITION 3 STATUS			N141	47				
	INFEED CONV B DRUM AT POSITION 4 STATUS			N141	48				
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N14	0	0			
5.5.3	AGV TRANSPORT COMMAND	NETCOM		N14	0	1			
	CONTAINER IDENTIFICATIONS			N141	25-32				

LCU 101 File 14 PLC Memory Map - Drum Infeed Conveyor B

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
5.5.9	RELEASE AGV FROM P&D LOCATION	NETCOM		N14	0	2			
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
05-XS-107AB/A	DRUM INFEED CONVEYOR B ROPE SWITCH PULLED STATUS			N149	0	0-1			
CV-05-101B/A	DRUM INFEED CONVEYOR B FAILED STATUS			N149	0	2-3			
CV-05-101TF/A	DRUM TRANSFER FAILURE			N149	0	4-5			
	BAD OR MISSING ROUTE			N149	0	6			
END OF LCU 101 FILE 14 MEMORY MAP									

LCU 101 File 15 PLC Memory Map - Drum Storage Carousel

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <---> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum Storage Carousel									
	INTERNAL DRUM PIN DATA TABLE - NDE PIN'S			N158	0-79				
	INTERNAL DRUM PIN DATA TABLE - PAN PIN'S			N158	80-159				
	INTERNAL DRUM PIN DATA TABLE - GEA PIN'S			N158	160-239				
	INTERNAL DRUM PIN DATA TABLE - DISCHCVYR PIN'S			N158	240-319				
	INTERNAL DRUM PIN DATA TABLE - AIRLOCK PIN'S			N158	320-399				
	INTERNAL DRUM PIN DATA TABLE - NDE POSITION FLAGS			B3		16-31			
	INTERNAL DRUM PIN DATA TABLE - PAN POSITION FLAGS			B3		32-47			
	INTERNAL DRUM PIN DATA TABLE - GEA POSITION FLAGS			B3		48-63			
	INTERNAL DRUM PIN DATA TABLE - DISCH POSITION FLAGS			B3		64-79			
	INTERNAL DRUM PIN DATA TABLE - AIRLK POSITION FLAGS			B3		80-95			
	NDE PIN TABLE POINTER			N15	40				
	PAN PIN TABLE POINTER			N15	41				
	GEA PIN TABLE POINTER			N15	42				
	DISCH PIN TABLE POINTER			N15	43				
	AIRLOCK PIN TABLE POINTER			N15	44				
	QC PIN TABLE POINTER			N15	45				
	DATA TABLE POINTER			N15	46				
	TEMPORARY POINTER			N15	47				
	NDE DRUM FLAG POINTER			N15	50				
	PAN DRUM FLAG POINTER			N15	51				
	GEA DRUM FLAG POINTER			N15	52				
	DISCH DRUM FLAG POINTER			N15	53				
	AIRLOCK DRUM FLAG POINTER			N15	54				
			DRUM	INDEX	WEIGHT	ROUT	STATUS		
			1	N158:410	N158:411	58:412-	N158:414		
			2	N158:415	N158:416	58:417-	N158:419		
			...	...	...	...	...		
			10	N158:455	N158:456	58:457-	N158:459		
	INTERNAL DRUM PIN DATA TABLE - DELETE PIN INDEX						N151	1	
	INTERNAL DRUM PIN DATA TABLE - INDEX			N158	410-459				
	INTERNAL DRUM PIN DATA TABLE - WEIGHT			N158	410-459				
	INTERNAL DRUM PIN DATA TABLE - ROUTE			N158	410-459				
	INTERNAL DRUM PIN DATA TABLE - STATUS			N158	410-459	1/8			
	QC DRUM PIN DATA TABLE - PIN			N158	460-475				
	QC DRUM PIN DATA TABLE - ROUTE			N158	476-479				
	CAROUSEL CONVEYOR DRUM TABLE - PIN			N158	480-487				

LCU 101 File 15 PLC Memory Map - Drum Storage Carousel

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	CAROUSEL CONVEYOR DRUM TABLE - WEIGHT			N158	488				
	CAROUSEL CONVEYOR DRUM TABLE - ROUTE			N158	489-490				
	CAROUSEL CONVEYOR DRUM TABLE - STATUS			N158	491				
	RTAP_TO_PLC DELETE DRUM INDEX			N151	1				
	RTAP_TO_PLC INITIATE VERIFICATION ASSAYS						N150	10	0
PCS To Carousel									
CV-09-102/ID	DRUM ID FOR RETRIEVAL SEARCH						N15	60-67	
CV-09-102/RD	RETRIEVE DRUM						N15	173	0
CV-09-102/SD	STORE DRUM						N15	173	1
Carousel To PCS									
CV-09-102/DR	DRUM RETRIEVED: READY FOR PICK-UP						N15	174	0
CV-09-102/DS	DRUM STORED						N15	174	1
CV-09-102/NF	DRUM NOT FOUND						N15	174	2
09-HS-209	L-O-R SWITCH (1 = REMOTE)						N15	174	3
	L-O-R SWITCH (1 = LOCAL)						N15	174	4
CV-09-102/CT	CAROUSEL TROUBLE (0=TROUBLE)						N15	174	5
CV-09-102/TF	DRUM TRANSFER FAILURE (0=FAILURE)						N15	174	6
	DRUM XFER COMPLETE, CAROUSEL TO AGV						N15	174	7
	DRUM XFER COMPLETE, AGV TO CAROUSEL						N15	174	8
	CAROUSEL AVAILABLE						N15	174	9
	CAROUSEL IN INITIALIZATION STATUS						N15	174	10
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N15	0	0			
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM		N15	0	1			
	CONTAINER IDENTIFICATION			N15	5-12				
5.5.3	AGV TRANSPORT COMMAND	NETCOM		N15	0	2			
	CONTAINER IDENTIFICATION			N15	13-20				
	PROCESS ROUTE (OF DRUM JUST DROPPED-OFF)			N15	21-22				
5.5.9	RELEASE AGV FROM P&D LOCATION	NETCOM		N15	0	3			
PCS To PLC									
5.6.7	AGV TRANSPORT COMMAND	NETCOM		N15					
	CONTAINER IDENTIFICATION			N15	23-30				
	PICKUP LOCATION			N15	31				
	PICKUP COMMAND/REQUEST			N15	32				
	DROPOFF LOCATION			N15	33				
	DROPOFF COMMAND/REQUEST			N15	34				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
CV-09-102NF/A	DRUM NOT FOUND STATUS			N159	0	0-1			

LCU 101 File 15 PLC Memory Map - Drum Storage Carousel

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <---> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
CV-09-102CT/A	CAROUSEL TROUBLE STATUS			N159	0	2-3			
	DRUM TRANSFER FAILURE			N159	0	4			
	AGV PICK-UP AIRLOCK DRUM NOT FOUND			N159	0	6			
	BSC FULL			N159	0	8			
END OF LCU 101 FILE 15 MEMORY MAP									

LCU 101 File 16 PLC Memory Map - Transfer Conveyors

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Transfer Conveyors									
PLC I/O									
NDE_A DRUM TRANSFER CONVEYORS EQUIPMENT - (CV-09-101A)									
09-HS-201A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:006/10	N95	006	8			
09-XS-201A/B	ROPE SWITCH A/B	DI	I:006/12	N95	006	10			
09-ZS-201A	AGV HANDSHAKE SIGNAL S1	DI	I:006/15	N95	006	13			
09-ZS-201C	AGV SIDE DRUM POSITION SWITCH	DI	I:006/13	N95	006	11			
09-ZS-201D	NDE SIDE DRUM POSITION SWITCH	DI	I:006/14	N95	006	12			
09-ZY-201A	AGV HANDSHAKE SIGNAL S1	DO	O:020/02	N95	020	02			
CV-09-101A/F	CONVEYOR MOTOR RUN FORWARD	DO	O:020/04	N95	020	04			
CV-09-101A/R	CONVEYOR MOTOR RUN REVERSE	DO	O:020/05	N95	020	05			
	RTAP_TO_PLC NDE_A IN AUTO			N160	0	0			
	RTAP_TO_PLC NDE_A DIRECTION = FORWARD			N160	0	1			
	RTAP_TO_PLC NDE_A START CONVEYOR			N160	0	2			
	INTERNAL PIN DATA TABLE - PIN			N168	0-7				
	INTERNAL PIN DATA TABLE - WEIGHT			N168	8				
	INTERNAL PIN DATA TABLE - ROUTE			N168	9-10				
	INTERNAL PIN DATA TABLE - SAMPLE/COMPLIANT			N168	11				
NDE_B DRUM TRANSFER CONVEYORS EQUIPMENT - (CV-09-101B)									
09-HS-202A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:007/00	N95	007	00			
09-XS-202A/B	ROPE SWITCH A/B	DI	I:007/02	N95	007	02			
09-ZS-202A	AGV HANDSHAKE SIGNAL S1	DI	I:007/05	N95	007	05			
09-ZS-202C	AGV SIDE DRUM POSITION SWITCH	DI	I:007/03	N95	007	03			
09-ZS-202D	NDE SIDE DRUM POSITION SWITCH	DI	I:007/04	N95	007	04			
09-ZY-202A	AGV HANDSHAKE SIGNAL S1	DO	O:020/6	N95	020	6			
CV-09-101B/F	CONVEYOR MOTOR RUN FORWARD	DO	O:020/10	N95	020	8			
CV-09-101B/R	CONVEYOR MOTOR RUN REVERSE	DO	O:020/11	N95	020	9			
	RTAP_TO_PLC NDE_B IN AUTO			N160	1	0			
	RTAP_TO_PLC NDE_B DIRECTION = FORWARD			N160	1	1			
	RTAP_TO_PLC NDE_B START CONVEYOR			N160	1	2			
	INTERNAL PIN DATA TABLE - PIN			N168	20-27				
	INTERNAL PIN DATA TABLE - WEIGHT			N168	28				
	INTERNAL PIN DATA TABLE - ROUTE			N168	29-30				
	INTERNAL PIN DATA TABLE - SAMPLE/COMPLIANT			N168	31				
PAN_A DRUM TRANSFER CONVEYORS EQUIPMENT - (CV-09-101C)									
09-HS-203A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:007/07	N95	007	07			
09-XS-203A/B	ROPE SWITCH A/B	DI	I:007/11	N95	007	9			
09-ZS-203A	AGV HANDSHAKE SIGNAL S1	DI	I:007/14	N95	007	12			

LCU 101 File 16 PLC Memory Map - Transfer Conveyors

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
09-ZS-203C	AGV SIDE DRUM POSITION SWITCH	DI	I:007/12	N95	007	10			
09-ZS-203D	PAN SIDE DRUM POSITION SWITCH	DI	I:007/13	N95	007	11			
09-ZY-203A	AGV HANDSHAKE SIGNAL S1	DO	O:020/12	N95	020	10			
CV-09-101C/F	CONVEYOR MOTOR RUN FORWARD	DO	O:020/14	N95	020	12			
CV-09-101C/R	CONVEYOR MOTOR RUN REVERSE	DO	O:020/15	N95	020	13			
	RTAP_TO_PLC PAN_A IN AUTO			N160	2	0			
	RTAP_TO_PLC PAN_A DIRECTION = FORWARD			N160	2	1			
	RTAP_TO_PLC PAN_A START CONVEYOR			N160	2	2			
	INTERNAL PIN DATA TABLE - PIN			N168	40-47				
	INTERNAL PIN DATA TABLE - WEIGHT			N168	48				
	INTERNAL PIN DATA TABLE - ROUTE			N168	49-50				
	INTERNAL PIN DATA TABLE - SAMPLE/COMPLIANT			N168	51				
PAN_B DRUM TRANSFER CONVEYORS EQUIPMENT - (CV-09-101D)									
09-HS-204A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:010/00	N95	010	00			
09-XS-204A/B	ROPE SWITCH A/B	DI	I:010/02	N95	010	02			
09-ZS-204A	AGV HANDSHAKE SIGNAL S1	DI	I:010/05	N95	010	05			
09-ZS-204C	AGV SIDE DRUM POSITION SWITCH	DI	I:010/03	N95	010	03			
09-ZS-204D	PAN SIDE DRUM POSITION SWITCH	DI	I:010/04	N95	010	04			
09-ZY-204A	AGV HANDSHAKE SIGNAL S1	DO	O:020/16	N95	020	14			
CV-09-101D/F	CONVEYOR MOTOR RUN FORWARD	DO	O:021/00	N95	021	00			
CV-09-101D/R	CONVEYOR MOTOR RUN REVERSE	DO	O:021/01	N95	021	01			
	RTAP_TO_PLC PAN_B IN AUTO			N160	3	0			
	RTAP_TO_PLC PAN_B DIRECTION = FORWARD			N160	3	1			
	RTAP_TO_PLC PAN_B START CONVEYOR			N160	3	2			
	INTERNAL PIN DATA TABLE - PIN			N168	60-67				
	INTERNAL PIN DATA TABLE - WEIGHT			N168	68				
	INTERNAL PIN DATA TABLE - ROUTE			N168	69-70				
	INTERNAL PIN DATA TABLE - SAMPLE/COMPLIANT			N168	71				
GEA_A DRUM TRANSFER CONVEYOR EQUIPMENT - (CV-09-101E)									
09-HS-205A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:010/10	N95	010	8			
09-XS-205A/B	ROPE SWITCH A/B	DI	I:010/12	N95	010	10			
09-ZS-205A	AGV HANDSHAKE SIGNAL S1	DI	I:010/15	N95	010	13			
09-ZS-205C	AGV SIDE DRUM POSITION SWITCH	DI	I:010/13	N95	010	11			
09-ZS-205D	GEA SIDE DRUM POSITION SWITCH	DI	I:010/14	N95	010	12			
09-ZY-205A	AGV HANDSHAKE SIGNAL S1	DO	O:021/02	N95	021	02			
CV-09-101E/F	CONVEYOR MOTOR RUN FORWARD	DO	O:021/04	N95	021	04			
CV-09-101E/R	CONVEYOR MOTOR RUN REVERSE	DO	O:021/05	N95	021	05			
	RTAP_TO_PLC GEA_A IN AUTO			N160	4	0			
	RTAP_TO_PLC GEA_A DIRECTION = FORWARD			N160	4	1			

LCU 101 File 16 PLC Memory Map - Transfer Conveyors

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	RTAP_TO_PLC GEA_A START CONVEYOR			N160	4	2			
	INTERNAL PIN DATA TABLE - PIN			N168	80-87				
	INTERNAL PIN DATA TABLE - WEIGHT			N168	88				
	INTERNAL PIN DATA TABLE - ROUTE			N168	89-90				
	INTERNAL PIN DATA TABLE - SAMPLE/COMPLIANT			N168	91				
GEA_B DRUM TRANSFER CONVEYORS EQUIPMENT - (CV-09-101F)									
09-HS-207A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:011/00	N95	011	00			
09-XS-207A/B	ROPE SWITCH A/B	DI	I:011/02	N95	011	02			
09-ZS-207A	AGV HANDSHAKE SIGNAL SI	DI	I:011/05	N95	011	05			
09-ZS-207C	AGV SIDE DRUM POSITION SWITCH	DI	I:011/03	N95	011	03			
09-ZS-207D	GEA SIDE DRUM POSITION SWITCH	DI	I:011/04	N95	011	04			
09-ZY-207A	AGV HANDSHAKE SIGNAL SI	DO	O:021/06	N95	021	06			
CV-09-101F/F	CONVEYOR MOTOR RUN FORWARD	DO	O:021/10	N95	021	8			
CV-09-101F/R	CONVEYOR MOTOR RUN REVERSE	DO	O:021/11	N95	021				
	RTAP_TO_PLC GEA_B IN AUTO			N160	5	0			
	RTAP_TO_PLC GEA_B DIRECTION = FORWARD			N160	5	1			
	RTAP_TO_PLC GEA_B START CONVEYOR			N160	5	2			
	INTERNAL PIN DATA TABLE - PIN			N168	100-107				
	DRUM SCALE A DRUM PIN MISMATCH			N168	108				
	INTERNAL PIN DATA TABLE - ROUTE			N168	109-110				
	INTERNAL PIN DATA TABLE - SAMPLE/COMPLIANT			N168	111				
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N16	0	0			
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM							
	CONTAINER(S) LOCATION			N16	2				
	CONTAINER IDENTIFICATIONS			N16	10-17				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
09-XS-201AB/A	EMERGENCY STOP ROPE SWITCH PULLED STATUS - NDE_A			N169	0	0-1			
09-XS-202AB/A	EMERGENCY STOP ROPE SWITCH PULLED STATUS - NDE_B			N169	0	2-3			
09-XS-203AB/A	EMERGENCY STOP ROPE SWITCH PULLED STATUS - PAN_A			N169	0	4-5			
09-XS-204AB/A	EMERGENCY STOP ROPE SWITCH PULLED STATUS - PAN_B			N169	0	6-7			
09-XS-205AB/A	EMERGENCY STOP ROPE SWITCH PULLED STATUS - GEA_A			N169	0	8-9			
09-XS-207AB/A	EMERGENCY STOP ROPE SWITCH PULLED STATUS - GEA_B			N169	0	10-11			
09-XS-201TF/A	TRANSFER FAILURE - NDE_A			N169	1	0-1			
09-XS-202TF/A	TRANSFER FAILURE - NDE_B			N169	1	2-3			
09-XS-203TF/A	TRANSFER FAILURE - PAN_A			N169	1	4-5			
09-XS-204TF/A	TRANSFER FAILURE - PAN_B			N169	1	6-7			
09-XS-205TF/A	TRANSFER FAILURE - GEA_A			N169	1	8-9			
09-XS-207TF/A	TRANSFER FAILURE - GEA_B			N169	1	10-11			

LCU 101 File 16 PLC Memory Map - Transfer Conveyors

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
END OF LCU 101 FILE 16 MEMORY MAP									

LCU 101 File 17 PLC Memory Map - Background Storage Conveyors

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Background Storage Conveyors									
PLC I/O									
BACKGROUND DRUM STORAGE CONVEYORS EQUIPMENT - (CV-09-105A)									
09-HS-208A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:011/10	N95	011	8			
09-XS-208A/B	ROPE SWITCH A/B	DI	I:011/12	N95	011	10			
09-ZS-208A	AGV HANDSHAKE SIGNAL S1	DI	I:011/15	N95	011	13			
09-ZS-208C	AGV SIDE DRUM POSITION SWITCH	DI	I:011/13	N95	011	11			
09-ZS-208D	BACK SIDE DRUM POSITION SWITCH	DI	I:011/14	N95	011	12			
09-ZY-208A	AGV HANDSHAKE SIGNAL S1	DO	O:021/12	N95	021	10			
CV-09-105A/F	CONVEYOR MOTOR RUN FORWARD	DO	O:021/14	N95	021	12			
CV-09-105A/R	CONVEYOR MOTOR RUN REVERSE	DO	O:021/15	N95	021	13			
	RTAP_TO_PLC BKGRD_A IN AUTO			N170	0	0			
	RTAP_TO_PLC BKGRD_A DIRECTION = FORWARD			N170	0	1			
	RTAP_TO_PLC BKGRD_A START CONVEYOR			N170	0	2			
	INTERNAL PIN DATA TABLE - PIN			N178	0-7				
	INTERNAL PIN DATA TABLE - WEIGHT			N178	8				
	INTERNAL PIN DATA TABLE - ROUTE			N178	9				
	INTERNAL PIN DATA TABLE - STATUS			N178	11				
BACKGROUND DRUM STORAGE CONVEYORS EQUIPMENT - (CV-09-105B)									
09-HS-210A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	DI	I:012/00	N95	012	00			
09-XS-210A/B	ROPE SWITCH A/B	DI	I:012/02	N95	012	02			
09-ZS-210A	AGV HANDSHAKE SIGNAL S1	DI	I:012/05	N95	012	05			
09-ZS-210C	AGV SIDE DRUM POSITION SWITCH	DI	I:012/03	N95	012	03			
09-ZS-210D	BACK SIDE DRUM POSITION SWITCH	DI	I:012/04	N95	012	04			
09-ZY-210A	AGV HANDSHAKE SIGNAL S1	DO	O:021/17	N95	021	15			
CV-09-105B/F	CONVEYOR MOTOR RUN FORWARD	DO	O:021/16	N95	021	14			
CV-09-105B/R	CONVEYOR MOTOR RUN REVERSE	DO	O:022/01	N95	022	1			
	RTAP_TO_PLC BKGRD_B IN AUTO			N170	1	0			
	RTAP_TO_PLC BKGRD_B DIRECTION = FORWARD			N170	1	1			
	RTAP_TO_PLC BKGRD_B START CONVEYOR			N170	1	2			
	INTERNAL PIN DATA TABLE - PIN			N178	20-27				
	INTERNAL PIN DATA TABLE - WEIGHT			N178	28				
	INTERNAL PIN DATA TABLE - ROUTE			N178	29				
	INTERNAL PIN DATA TABLE - STATUS			N178	31				
	RTAP_TO_PLC INITIATE BACKGROUND CHECKS			N170	0	10			
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N17	0	0			
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM							

LCU 101 File 17 PLC Memory Map - Background Storage Conveyors

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	CONTAINER(S) LOCATION			N17	2				
	CONTAINER IDENTIFICATIONS			N17	5-12				
5.5.3	**AGV TRANSPORT COMMAND**	NETCOM		N17	0	1			
	CONTAINER IDENTIFICATION			N17	14				
	PICK-UP LOCATION			N17	15				
	DROP-OFF LOCATION			N17	16				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
09-XS-208AB/A	**EMERGENCY STOP ROPE SWITCH PULLED STATUS - BACKGROUND CONV A**			N179	0	0-1			
09-XS-210AB/A	**EMERGENCY STOP ROPE SWITCH PULLED STATUS - BACKGROUND CONV B**			N179	0	2-3			
09-XS-208TF/A	**TRANSFER FAILURE - BACKGROUND CONV A**			N179	0	4-5			
09-XS-210TF/A	**TRANSFER FAILURE - BACKGROUND CONV B**			N179	0	6-7			
END OF LCU 101 FILE 17 MEMORY MAP									

LCU 101 File 18 PLC Memory Map - Empty Drum Infeed Conveyor

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Empty Drum Infeed Conveyor									
PLC I/O									
05-HS-117A	EMPTY DRUM INFEED CONVEYOR IN REMOTE	DI	I:016/02	N95	016	02			
05-ZS-117D	EMPTY DRUM INFEED CONVEYOR CRANE-SIDE INDEX POS. SW.	DI	I:016/03	N95	016	03			
05-XS-117A/B	EMPTY DRUM INFEED CONVEYOR E-STOP ROPE SWITCHES	DI	I:016/04	N95	016	04			
05-ZS-117A	EMPTY DRUM INFEED CONVEYOR DRUM AT AGV-END POS. SW.	DI	I:016/05	N95	016	05			
05-ZS-117B	EMPTY DRUM INFEED CONVEYOR AGV HANDSHAKE	DI	I:016/06	N95	016	06			
05-ZS-117E	EMPTY DRUM INFEED CONVEYOR DRUM AT CRANE-END POS. SW.	DI	I:016/07	N95	016	07			
CV-05-105/FS	EMPTY DRUM INFEED CONVEYOR STATUS - RUNNING FORWARD	DI	I:016/10	N95	016	8			
CV-05-105/RS	EMPTY DRUM INFEED CONVEYOR STATUS - RUNNING REVERSE	DI	I:016/11	N95	016	9			
05-ZS-117F	EMPTY DRUM INFEED CONVEYOR AGV-SIDE INDEX POS. SW.	DI	I:016/12	N95	016	10			
05-HS-117B	EMPTY DRUM INFEED CONVEYOR AGV PICK-UP ENABLE	DI	I:016/13	N95	016	11			
05-HS-117D/SP	EMPTY DRUM INFEED CONVEYOR STOP P.B.	DI	I:016/14	N95	016	12			
05-HS-117D/F	EMPTY DRUM INFEED CONVEYOR START FORWARD P.B.	DI	I:016/15	N95	016	13			
05-HS-117D/R	EMPTY DRUM INFEED CONVEYOR START REVERSE P.B.	DI	I:016/16	N95	016	14			
05-ZY-117B	EMPTY DRUM INFEED CONVEYOR AGV HANDSHAKE	DO	O:023/15	N95	023	13			
CV-05-105/F	EMPTY DRUM INFEED CONVEYOR RUN FORWARD	DO	O:023/17	N95	023	15			
CV-05-105/R	EMPTY DRUM INFEED CONVEYOR RUN REVERSE	DO	O:024/00	N95	024	00			
	EMPTY INFEED CONV DRUM AT POSITION 1			N181	91	12			
	EMPTY INFEED CONV DRUM AT POSITION 2			N181	92	12			
	EMPTY INFEED CONV DRUM AT POSITION 3			N181	93	12			
	EMPTY INFEED CONV DRUM AT POSITION 4			N181	94	12			
	EMPTY INFEED CONV DRUM AT POSITION 5			N181	95	12			
	EMPTY INFEED CONV DRUM AT POSITION 6			N181	96	12			
	EMPTY INFEED CONV DRUM AT POSITION 7			N181	97	12			
	EMPTY INFEED CONV DRUM AT POSITION 8			N181	98	12			
	EMPTY INFEED CONV DRUM AT POSITION 9			N181	99	12			
	EMPTY INFEED CONV DRUM AT POSITION 1 PIN			N181	1-8				
	EMPTY INFEED CONV DRUM AT POSITION 2 PIN			N181	9-16				
	EMPTY INFEED CONV DRUM AT POSITION 3 PIN			N181	17-24				
	EMPTY INFEED CONV DRUM AT POSITION 4 PIN			N181	25-32				
	EMPTY INFEED CONV DRUM AT POSITION 5 PIN			N181	33-40				
	EMPTY INFEED CONV DRUM AT POSITION 6 PIN			N181	41-48				
	EMPTY INFEED CONV DRUM AT POSITION 7 PIN			N181	49-56				
	EMPTY INFEED CONV DRUM AT POSITION 8 PIN			N181	57-64				
	EMPTY INFEED CONV DRUM AT POSITION 9 PIN			N181	65-72				
	EMPTY INFEED CONV DRUM AT POSITION 1 ROUTE			N181	73-74				
	EMPTY INFEED CONV DRUM AT POSITION 2 ROUTE			N181	75-76				

LCU 101 File 18 PLC Memory Map - Empty Drum Infeed Conveyor

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	EMPTY INFEED CONV DRUM AT POSITION 3 ROUTE			N181	77-78				
	EMPTY INFEED CONV DRUM AT POSITION 4 ROUTE			N181	79-80				
	EMPTY INFEED CONV DRUM AT POSITION 5 ROUTE			N181	81-82				
	EMPTY INFEED CONV DRUM AT POSITION 6 ROUTE			N181	83-84				
	EMPTY INFEED CONV DRUM AT POSITION 7 ROUTE			N181	85-86				
	EMPTY INFEED CONV DRUM AT POSITION 8 ROUTE			N181	87-88				
	EMPTY INFEED CONV DRUM AT POSITION 9 ROUTE			N181	89-90				
	EMPTY INFEED CONV DRUM AT POSITION 1 STATUS			N181	91				
	EMPTY INFEED CONV DRUM AT POSITION 2 STATUS			N181	92				
	EMPTY INFEED CONV DRUM AT POSITION 3 STATUS			N181	93				
	EMPTY INFEED CONV DRUM AT POSITION 4 STATUS			N181	94				
	EMPTY INFEED CONV DRUM AT POSITION 5 STATUS			N181	95				
	EMPTY INFEED CONV DRUM AT POSITION 6 STATUS			N181	96				
	EMPTY INFEED CONV DRUM AT POSITION 7 STATUS			N181	97				
	EMPTY INFEED CONV DRUM AT POSITION 8 STATUS			N181	98				
	EMPTY INFEED CONV DRUM AT POSITION 9 STATUS			N181	99				
	PORTABLE BAR CODE SCANNER								
	PLC TO PCS DISCONNECT BAR CODE LINK			N181	476	0			
	PCS TO PLC BAR CODE (BRCTS) HANDSHAKING BIT			N180	476	0			
	PCS TO PLC BAR CODE (BRCTS2) HANDSHAKING BIT			N180	476	1			
	PCS TO PLC BAR CODE LINK ESTABLISHED			N180	476	2			
	PCS TO PLC BAR CODE COMMAND REGISTER			N180	0-15				
	TEMPORARY INTERNAL DRUM PIN DATA TABLE			N188	8-39				
	PLC TO PCS BAR CODE TERMINAL ID			N181	218				
	PLC TO PCS BAR CODE MESSAGE LENGTH			N181	219				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)			N181	220-235				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)			N181	236-251				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)			N181	252-267				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)			N181	268-283				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)			N181	284-299				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)			N181	300-315				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)			N181	316-331				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)			N181	332-347				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)			N181	348-363				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)			N181	364-379				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)			N181	380-395				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)			N181	396-411				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)			N181	412-427				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)			N181	428-443				

LCU 101 File 18 PLC Memory Map - Empty Drum Infeed Conveyor

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)			N181	444-459				
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)			N181	460-475				
	BAR CODE MESSAGE RECEIVED			N18	3	10			
	BAR CODE IS A CONTAINER PIN			N18	3	11			
	"CNCL PREV READ" BAR CODE RECEIVED			N18	3	12			
	"END" BAR CODE RECEIVED			N18	3	13			
	"CANCEL OPERATION" BAR CODE RECEIVED			N18	3	14			
RTAP-TO-PLC	**ISSUE PU AT EMPTY INFEED**			N181	110	0			
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N18	0	0			
5.3.1	**SEND WASTE CONTAINER LOCATION UPDATE MSG.**	NETCOM		N18	0	1			
	NUMBER CONTAINERS			C5	5	ACC			
	CONTAINER IDENTIFICATIONS			N188	8-39				
5.5.3	**AGV TRANSPORT COMMAND**	NETCOM		N18	0	2			
	CONTAINER IDENTIFICATIONS			N188	64				
5.5.9	**RELEASE AGV FROM P&D LOCATION**	NETCOM		N18	0	3			
PCS To PLC									
	PCS TO PLC MESSAGE DESTINATION = RECEIVING			B3		4			
5.4.15	**EMPTY DRUM PROCESS ROUTE**	NETCOM		N18	1	0			
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS			N18	20-27				
	PROCESS ROUTE			N18	28-29				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
05-XS-117AB/A	**EMERGENCY STOP ROPE SWITCH PULLED STATUS**			N189	0	0-1			
CV-05-105/A	**EMPTY DRUM INFEED CONVEYOR FAILED STATUS**			N189	0	2-3			
CV-05-105TF/A	**EMPTY DRUM INFEED CONVEYOR DRUM TRANSFER FAILURE**			N189	0	4-5			
	EMPTY DRUM PROCESS ROUTE DRUM NOT FOUND			N189	0	6			
	DRUM PIN MISMATCH - CRANE END			N189	0	8			
	DRUM NOT AT READY POSITION			N189	0	10			
	DRUM PIN MISMATCH - AGV END			N189	0	12			
	BAD/MISSING DRUM ROUTE			N189	0	14			
END OF LCU 101 FILE 18 MEMORY MAP									

LCU 101 File 19 PLC Memory Map - Drum Discharge Conveyor

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum Discharge Conveyor									
PLC I/O									
05-HS-109A	DRUM DISCHARGE CONVEYOR IN REMOTE	DI	I:014/15	N95	014	13			
05-HS-109B	DRUM DISCHARGE CONVEYOR INDEX CLUTCH SOLENOID IN REMOTE	DI	I:014/16	N95	014	14			
05-XS-109A/B	DRUM DISCHARGE CONVEYOR ROPE SWITCH EMERGENCY STOP	DI	I:014/17	N95	014	15			
05-ZS-109A	DRUM DISCHARGE CONVEYOR NOT FULL	DI	I:015/00	N95	015	00			
05-ZS-109B	DRUM AT READY POSITION ON DRUM DISCHARGE CONVEYOR	DI	I:015/01	N95	015	01			
05-ZS-109C	AGV HAND SHAKE INPUT	DI	I:015/02	N95	015	02			
CV-05-102/S	DRUM DISCHARGE CONVEYOR RUNNING	DI	I:015/04	N95	015	04			
05-ZEV-109	DRUM DISCHARGE CONVEYOR INDEX CLUTCH SOLENOID	DO	O:023/04	N95	023	04			
05-ZY-109C	AGV HAND SHAKE OUTPUT	DO	O:023/05	N95	023	05			
CV-05-102	DRUM DISCHARGE CONVEYOR RUN	DO	O:023/07	N95	023	07			
	INTERNAL PIN DATA TABLE - PIN			N198	0-31				
	DRUM AT POSITION 1			N198	40	0			
	DRUM AT POSITION 2			N198	40	1			
	DRUM AT POSITION 3			N198	40	2			
	DRUM AT POSITION 4			N198	40	3			
	WEIGHT OF DRUM AT POSITION 1			N198	41				
	WEIGHT OF DRUM AT POSITION 2			N198	42				
	WEIGHT OF DRUM AT POSITION 3			N198	43				
	WEIGHT OF DRUM AT POSITION 4			N198	44				
	FLAGS OF DRUM AT POSITION 1			N198	45				
	FLAGS OF DRUM AT POSITION 2			N198	46				
	FLAGS OF DRUM AT POSITION 3			N198	47				
	FLAGS OF DRUM AT POSITION 4			N198	48				
PLC To PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N19	0	0			
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM							
	CONTAINER IDENTIFICATIONS			N19	5-12				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
05-XS-109AB/A	EMERGENCY STOP ROPE SWITCH PULLED STATUS			N199	0	0-1			
CV-05-102/A	DRUM DISCHARGE CONVEYOR FAILED STATUS			N199	0	2-3			
05-XS-109TF/A	TRANSFER FAILURE			N199	0	4-5			
END OF LCU 101 FILE 19 MEMORY MAP									

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	NDE_A FAULT; EXAMINATION ABORTED	DI	I:012/14				N95	012	12
ND-06-104A/DC	NDE_A DRUM DOOR CLOSED	DI	I:012/17				N95	012	15
ND-06-104A/CS	NDE_A INTERNAL CONVEYOR STARTED FOR TRANSFER	DI	I:012/15				N95	012	13
ND-06-104A/EC	NDE_A EXAMINATION COMPLETE	DI	I:012/16				N95	012	14
ND-06-104A/ES	NDE_A EXAMINATION IN PROGRESS	DI	I:013/00				N95	013	00
ND-06-104A/IF	NDE_A FAULT; EXAMINATION CONTINUING	DI	I:013/01				N95	013	01
ND-06-104A/PS	NDE_A DRUM PRESENCE SENSED IN VAULT	DI	I:013/02				N95	013	02
ND-06-104A/RD	NDE_A READY TO ACCEPT DRUM	DI	I:013/03				N95	013	03
ND-06-104A/CE	NDE_A "CLOSE VAULT DOOR" ENABLED	DO	O:022/02				N95	022	02
	RTAP_TO_PLC NDA_A "CLOSE VAULT DOOR" ENABLED						N250	20	0
ND-06-104A/PD	NDE_A READY TO PICKUP DRUM FROM VAULT; CONVEYOR STARTED	DO	O:022/03				N95	022	03
ND-06-104A/QD	NDE_A REQUEST TO DROPOFF DRUM INTO VAULT	DO	O:022/04				N95	022	04
ND-06-104A/SP	NDE_A ABORT EXAMINATION	DO	O:022/05				N95	022	05
	RTAP_TO_PLC NDE_A ABORT EXAMINATION						N250	20	1
ND-06-104A/ST	NDE_A DRUM OUT; STOP INTERNAL CONVEYOR	DO	O:022/06				N95	022	06
	INTERNAL DRUM PIN DATA TABLE - PIN			N258	0-7				
	INTERNAL DRUM PIN DATA TABLE - WEIGHT			N258	8				
	INTERNAL DRUM PIN DATA TABLE - ROUTE			N258	9-10				
	INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	11				
NDE VAULT B (ND-06-104B)									
ND-06-104B/AS	NDE_B FAULT; EXAMINATION ABORTED	DI	I:013/04				N95	013	04
ND-06-104B/CS	NDE_B INTERNAL CONVEYOR STARTED FOR TRANSFER	DI	I:013/05				N95	013	05
ND-06-104B/EC	NDE_B EXAMINATION COMPLETE	DI	I:013/06				N95	013	06
ND-06-104B/ES	NDE_B EXAMINATION IN PROGRESS	DI	I:013/07				N95	013	07
ND-06-104B/IF	NDE_B FAULT; EXAMINATION CONTINUING	DI	I:013/10				N95	013	8
ND-06-104B/PS	NDE_B DRUM PRESENCE SENSED IN VAULT	DI	I:013/11				N95	013	9
ND-06-104B/RD	NDE_B READY TO ACCEPT DRUM	DI	I:013/12				N95	013	10
ND-06-104B/DC	NDE_B DRUM DOOR CLOSED	DI	I:013/13				N95	013	11
	RTAP_TO_PLC NDA_B "CLOSE VAULT DOOR" ENABLED						N250	21	0
ND-06-104B/PD	NDE_B READY TO PICKUP DRUM FROM VAULT; CONVEYOR STARTED	DO	O:022/11				N95	022	9
ND-06-104B/QD	NDE_B REQUEST TO DROPOFF DRUM INTO VAULT	DO	O:022/12				N95	022	10
ND-06-104B/SP	NDE_B ABORT EXAMINATION	DO	O:022/13				N95	022	11
	RTAP_TO_PLC NDE_B ABORT EXAMINATION						N250	21	1
ND-06-104B/ST	NDE_B DRUM OUT; STOP INTERNAL CONVEYOR	DO	O:022/14				N95	022	12
	INTERNAL DRUM PIN DATA TABLE - PIN			N258	20-27				

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	NDE_A FAULT; EXAMINATION ABORTED	DI	I:012/14				N95	012	12
	INTERNAL DRUM PIN DATA TABLE - WEIGHT			N258	28				
	INTERNAL DRUM PIN DATA TABLE - ROUTE			N258	29-30				
	INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	31				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
ND-06-104A/AS	NDE_A FAULT; EXAMINATION ABORTED			N259	0	0-1	N251	200	0-1
ND-06-104A/IF	NDE_A FAULT; EXAMINATION CONTINUING			N259	0	2-3	N251	200	2-3
ND-06-104B/AS	NDE_B FAULT; EXAMINATION ABORTED			N259	0	4-5	N251	200	4-5
ND-06-104B/IF	NDE_B FAULT; EXAMINATION CONTINUING			N259	0	6-7	N251	200	6-7
PAN									
	PAN_A INTERNAL DRUM PIN DATA TABLE - PIN			N258	40-47				
	PAN_A INTERNAL DRUM PIN DATA TABLE - WEIGHT			N258	48				
	PAN_A INTERNAL DRUM PIN DATA TABLE - ROUTE			N258	49-50				
	PAN_A INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	51				
	RTAP_TO_PLC PAN_A ABORT ASSAY						N250	22	0
	RTAP_TO_PLC PAN_A READY TO OBSERVE STRIKE SHAPE						N250	22	1
	RTAP_TO_PLC PAN_A NEUTRON PULSE STRIKE SHAPE RESULT						N250	22	2
	RTAP_TO_PLC PAN_A NEUTRON PULSE STRIKE SHAPE GOOD/BAD (1=GOOD)						N250	22	3
	PCL_TO_RTAP PAN_A REQUEST NEUTRON PULSE FOR STRIKE SHAPE						N251	2	0
	PAN_B INTERNAL DRUM PIN DATA TABLE - PIN			N258	60-67				
	PAN_B INTERNAL DRUM PIN DATA TABLE - WEIGHT			N258	68				
	PAN_B INTERNAL DRUM PIN DATA TABLE - ROUTE			N258	69-70				
	PAN_B INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	71				
	RTAP_TO_PLC PAN_B ABORT ASSAY						N250	23	0
	RTAP_TO_PLC PAN_B READY TO OBSERVE STRIKE SHAPE						N250	23	1
	RTAP_TO_PLC PAN_B NEUTRON PULSE STRIKE SHAPE RESULT						N250	23	2
	RTAP_TO_PLC PAN_B NEUTRON PULSE STRIKE SHAPE GOOD/BAD (1=GOOD)						N250	23	3
	PCL_TO_RTAP PAN_B REQUEST NEUTRON PULSE FOR STRIKE SHAPE						N251	3	0
PLC To PAN									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N25	0	0			
5.11.2	ABORT PAN ASSAY	NETCOM		N25	0	3			
	PAN STATION LETTER CONFIRM			N25	11				
5.11.3	REQUEST TO DROP OFF DRUM	NETCOM		N16	0	7			
	PAN STATION LETTER CONFIRM			N25	12				

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	**NDE_A FAULT; EXAMINATION ABORTED**	DI	I:012/14				N95	012	12
5.11.4	**READY TO PICKUP DRUM, START CONVEYOR**	NETCOM		N16	0	8			
	PAN STATION LETTER CONFIRM			N25	13				
5.11.5	**STOP DRUM TRANSFER CONVEYOR**	NETCOM		N16	0	9			
	PAN STATION LETTER CONFIRM			N25	14				
5.11.6	**READY TO OBSERVE STRIKE SHAPE**	NETCOM		N25	0	4			
	PAN STATION LETTER CONFIRM			N25	15				
5.11.7	**NEUTRON PULE STRIKE SHAPE GOOD**	NETCOM		N25	0	5			
	PAN STATION LETTER CONFIRM			N25	16				
5.11.8	**NEUTRON PULE STRIKE SHAPE BAD**	NETCOM		N25	0	6			
	PAN STATION LETTER CONFIRM			N25	17				
PAN To PLC									
	PCS TO PLC MESSAGE DESTINATION = RECEIVING			B3		14			
5.12.1	**STATUS OF PAN SYSTEM A**	NETCOM		N25	1	0			
	PAN STATION LETTER CONFIRM			N25	18				
	STATUS VALUE			N25	19-20				
	SOFTWARE ERROR CODE			N25	21				
	STATUS MESSAGE			N25	22-53				
	PAN_A AVAILABLE			N25	54	0			
	PAN_A EXAM IN PROGRESS			N25	54	1			
	PAN_A EXAM COMPLETE			N25	54	2			
5.12.1	**STATUS OF PAN SYSTEM B**	NETCOM		N25	1	0			
	PAN STATION LETTER CONFIRM			N25	55				
	STATUS VALUE			N25	56-57				
	SOFTWARE ERROR CODE			N25	58				
	DRUM SCALE A DRUM PIN MISMATCH			N25	59-90				
	PAN_B AVAILABLE			N25	54	8			
	PAN_B EXAM IN PROGRESS			N25	54	9			
	PAN_B EXAM COMPLETE			N25	54	10			
5.12.2	**READY TO ACCEPT DRUM TRANSFER**	NETCOM		N25	1	1			
	PAN STATION LETTER CONFIRM			N25	91				
	PAN_A INTERNAL CONVEYOR RUNNING			N25	3	0			
	PAN_B INTERNAL CONVEYOR RUNNING			N25	3	1			
5.12.3	**DRUM PRESENCE SENSED IN STATION, CONVEYOR STOPPED**	NETCOM		N25	1	2			

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	**NDE_A FAULT; EXAMINATION ABORTED**	DI	I:012/14				N95	012	12
	PAN STATION LETTER CONFIRM			N25	92				
	PAN_A INTERNAL CONVEYOR STOPPED			N25	3	2			
	PAN_B INTERNAL CONVEYOR STOPPED			N25	3	3			
5.12.4	**REQUEST NEUTRON PULSE FOR STRIKE**	NETCOM		N25	1	3			
	PAN STATION LETTER CONFIRM			N25	93				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
	PAN_A FAULT; EXAMINATION ABORTED			N259	1	0-1			
	PAN_A FAULT; EXAMINATION CONTINUING			N259	1	2-3			
	PAN_B FAULT; EXAMINATION ABORTED			N259	1	4-5			
	PAN_B FAULT; EXAMINATION CONTINUING			N259	1	6-7			
GEA									
	GEA_A INTERNAL DRUM PIN DATA TABLE - PIN			N258	80-87				
	GEA_A INTERNAL DRUM PIN DATA TABLE - WEIGHT			N258	88				
	GEA_A INTERNAL DRUM PIN DATA TABLE - ROUTE			N258	89-90				
	GEA_A INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	91				
	GEA_B INTERNAL DRUM PIN DATA TABLE - PIN			N258	100-107				
	GEA_B INTERNAL DRUM PIN DATA TABLE - WEIGHT			N258	108				
	GEA_B INTERNAL DRUM PIN DATA TABLE - ROUTE			N258	109-110				
	GEA_B INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	111				
	RTAP_TO_PLC GEA_A ABORT ASSAY						N250	24	0
	RTAP_TO_PLC GEA_B ABORT ASSAY						N250	25	0
PLC To PCS (GEA)									
5.13.2	**ABORT GEA ASSY**	NETCOM		N25	0	7			
	GEA STATION LETTER CONFIRM			N25	101				
5.13.3	**REQUEST TO DROP OFF DRUM**	NETCOM		N16	0	10			
	GEA STATION LETTER CONFIRM			N25	102				
5.13.4	**READY TO PICKUP DRUM, START CONVEYOR**	NETCOM		N16	0	11			
	GEA STATION LETTER CONFIRM			N25	103				
5.13.5	**STOP DRUM TRANSFER CONVEYOR**	NETCOM		N16	0	12			
	GEA STATION LETTER CONFIRM			N25	104				
PCS (GEA) To PLC									
5.14.1	**STATUS OF GEA SYSTEM A**	NETCOM		N25	1	8			

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	**NDE_A FAULT; EXAMINATION ABORTED**	DI	I:012/14				N95	012	12
	GEA STATION LETTER CONFIRM			N25	105				
	STATUS VALUE			N25	106-107				
	SOFTWARE ERROR CODE			N25	108				
	STATUS MESSAGE			N25	109-140				
	GEA_A AVAILABLE			N25	178	0			
	GEA_A EXAM IN PROGRESS			N25	178	1			
	GEA_A EXAM COMPLETE			N25	178	2			
5.14.1	**STATUS OF GEA SYSTEM B**	NETCOM		N25	1	8			
	GEA STATION LETTER CONFIRM			N25	141				
	STATUS VALUE			N25	142-143				
	SOFTWARE ERROR CODE			N25	144				
	STATUS MESSAGE			N25	145-176				
	GEA_B AVAILABLE			N25	178	8			
	GEA_B EXAM IN PROGRESS			N25	178	9			
	GEA_B EXAM COMPLETE			N25	178	10			
5.14.2	**READY TO ACCEPT DRUM TRANSFER**	NETCOM		N25	1	9			
	GEA STATION LETTER CONFIRM			N25	177				
	GEA_A INTERNAL CONVEYOR RUNNING			N25	180	4			
	GEA_B INTERNAL CONVEYOR RUNNING			N25	180	5			
5.14.3	**DRUM PRESENCE SENSED IN STATION, CONVEYOR STOPPED**	NETCOM		N25	1	10			
	GEA STATION LETTER CONFIRM			N25	179				
	GEA_A INTERNAL CONVEYOR STOPPED			N25	180	6			
	GEA_B INTERNAL CONVEYOR STOPPED			N25	180	7			
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
	GEA_A FAULT; EXAMINATION ABORTED			N259	2	0-1			
	GEA_A FAULT; EXAMINATION CONTINUING			N259	2	2-3			
	GEA_B FAULT; EXAMINATION ABORTED			N259	2	4-5			
	GEA_B FAULT; EXAMINATION CONTINUING			N259	2	6-7			
BWAS									
PLC I/O									
	PORTABLE BAR CODE SCANNER	RS-485							
	PLC TO PCS DISCONNECT BAR CODE LINK						N251	476	0
	PCS TO PLC BAR CODE (BCTS) HANDSHAKING BIT						N250	476	0
	PCS TO PLC BAR CODE (BCTS2) HANDSHAKING BIT						N250	476	1

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	**NDE_A FAULT; EXAMINATION ABORTED**	DI	I:012/14				N95	012	12
	PCS TO PLC BAR CODE LINK ESTABLISHED						N250	476	2
	PCS TO PLC BAR CODE COMMAND REGISTER						N250	0-15	
	TEMPORARY DRUM PIN TABLE			N258	160-167				
	BWAS DRUM PIN DATA TABLE - PIN			N258	120-127				
	BWAS DRUM PIN DATA TABLE - WEIGHT			N258	128				
	BWAS DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	129				
	PLC TO PCS BAR CODE TERMINAL ID						N251	218	
	PLC TO PCS BAR CODE MESSAGE LENGTH						N251	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)						N251	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)						N251	236-251	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)						N251	252-267	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)						N251	268-283	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)						N251	284-299	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)						N251	300-315	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)						N251	316-331	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)						N251	332-347	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)						N251	348-363	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)						N251	364-379	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)						N251	380-395	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)						N251	396-411	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)						N251	412-427	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)						N251	428-443	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)						N251	444-459	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)						N251	460-475	
	BAR CODE MESSAGE RECEIVED			N25	200	0			
	BAR CODE IS A CONTAINER PIN			N25	200	1			
	"CNCL PREV READ" BAR CODE RECEIVED			N25	200	2			
	"END" BAR CODE RECEIVED			N25	200	3			
	"CANCEL OPERATION" BAR CODE RECEIVED			N25	200	4			
	RTAP_TO_PLC ABORT BWAS						N250	30	0
PLC To DMS									
5.3.1	**CONTAINER LOCATION UPDATE**	NETCOM		N25	0	1			
	CONTAINER LOCATION			N25	190				
	CONTAINER IDENTIFICATION			N25	191-198				

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <---> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	NDE_A FAULT; EXAMINATION ABORTED	DI	I:012/14				N95	012	12
5.3.24	REQUEST STATUS OF BWAS SYSTEM MESSAGE	NETCOM		N25	201	0			
5.3.28	ABORT BWAS	NETCOM		N25	0	8			
DMS To PLC									
5.4.8	BWAS ASSAY STARTED	NETCOM		N25	201	1			
5.4.9	BWAS ASSAY ABORT	NETCOM		N25	201	2			
5.4.10	BWAS ASSAY COMPLETED	NETCOM		N25	201	3			
5.4.11	STATUS OF BWAS SYSTEM	NETCOM		N25	201	4			
	EQUIP. STATUS VALUE			N25	202-203				
	SOFTWARE ERROR CODE			N25	204				
	EQUIP. STATUS MESSAGE			N25	205-236				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
	BWAS ASSAY ABORTED			N259	3	0-1			
Box NDE									
PLC I/O									
09-HS-219A	HAND-OFF-AUTO (H-O-A) SWITCH	DI	I:012/10				N95	-HS	8
09-XS-219A/B	BOX TRANSFER CONVEYOR E-STOP ROPE SWITCHES	DI	I:012/11				N95	-XS	9
09-ZS-219	BOX AT UNLOADING POSITION ON BOX (TRANSFER) CONVEYOR	DI	I:012/12				N95	-ZS	10
09-HS-219C	READY TO SEND BOX (INITIATE CONVEYOR FORWARD)- PUSH BUTTON	DI	I:012/13				N95	-HS	11
ND-06-105/AS	BOX NDE INSTRUMENT FAULT; EXAMINATION ABORTED	DI	I:017/11				N95	-06	9
ND-06-105/CF	START BOX (TRANSFER) CONVEYOR FORWARD	DI	I:017/06				N95	-06	10
ND-06-105/DC	BOX NDE VAULT DOOR CLOSED	DI	I:017/15				N95	-06	13
ND-06-105/EC	BOX EXAMINATION COMPLETE (STATUS: MAGENTA)	DI	I:017/13				N95	-06	11
ND-06-105/ES	EXAMINATION IN PROGRESS (STATUS: GREEN)	DI	I:017/10				N95	-06	8
ND-06-105/IF	BOX NDE INSTRUMENT FAULT; EXAMINATION CONTINUING	DI	I:017/12				N95	-06	10
ND-06-105/PS	BOX PRESENCE DETECTED IN NDE VAULT	DI	I:017/07				N95	-06	10
ND-06-105/RD	READY TO HAVE BOX DROPPED OFF	DI	I:017/14				N95	-06	12
104-CV-09-106/F	BOX (TRANSFER) CONVEYOR/SCALE - RUN FORWARD	DO	O:021/03				N95	4-C	-0
104-CV-09-106/R	BOX (TRANSFER) CONVEYOR/SCALE - RUN REVERSE	DO	O:021/13				N95	4-C	11
ND-06-105/CE	CLOSE VAULT DOOR ENABLED	DO	O:024/04				N95	-06	10
	RTAP_TO_PLC CLOSE VAULT DOOR ENABLED						N250	30	0
ND-06-105/CR	READY TO PICKUP BOX FROM VAULT; CONVEYOR STARTED	DO	O:024/06				N95	-06	10
ND-06-105/CS	BOX OUT - STOP INTERNAL CONVEYOR	DO	O:024/07				N95	-06	10
ND-06-105/QD	READY TO SEND BOX (INITIATE CONVEYOR FORWARD)	DO	O:024/03				N95	-06	10
ND-06-105/SP	ABORT EXAMINATION	DO	O:024/05				N95	-06	10

LCU 101 File 25 PLC Memory Map - Drum NDE, PAN, GEA, BWAS, Box NDE

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <---> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
Drum NDE									
PLC I/O									
NDE VAULT A (ND-06-104A)									
ND-06-104A/AS	NDE_A FAULT; EXAMINATION ABORTED	DI	I:012/14				N95	012	12
	RTAP_TO_PLC ABORT EXAMINATION						N250	30	1
09-WIT-219	BOX WEIGHT AT BOX CONVEYOR/SCALE	RS-232					N254	0-1	
	INTERNAL DRUM PIN DATA TABLE - PIN			N258	140-147				
	INTERNAL DRUM PIN DATA TABLE - WEIGHT			N258	148-149				
	INTERNAL DRUM PIN DATA TABLE - SAMPLE/COMPLIANT			N258	150				
PLC To DMS									
5.3.2	CONTAINER LOCATION UPDATE W/ WEIGHT	NETCOM		N25					
	CONTAINER LOCATION			N25	264				
	CONTAINER IDENTIFICATION			N25	265-272				
	CONTAINER WEIGHT			N25	273-274				
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
	BOX NDE FAULT; EXAM ABORTED			N259	4	0-1			
	BOX NDE FAULT; EXAM CONTINUING			N259	4	0-1			
	BOX NDE TRANSFER CONVEYOR ROPE SWITCHES			N259	4	4-6			
END OF LCU 101 FILE 25 MEMORY MAP									

LCU 101 File 20 PLC Memory Map -- NDE Supervisory

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
PLC I/O									
05-HS-104	SHIPPING/RECEIVING - NDE/NDA ISOLATION DOOR IN REMOTE	DI	I:017/00	N95	017	00			
05-ZS-105	SHIPPING/RECEIVING - NDE/NDA ISOLATION DOOR CLEAR	DI	I:017/01	N95	017	01			
05-ZSC-104	SHIPPING/RECEIVING - NDE/NDA ISOLATION DOOR CLOSED	DI	I:017/02	N95	017	02			
05-ZSO-104	SHIPPING/RECEIVING - NDE/NDA ISOLATION DOOR OPEN	DI	I:017/03	N95	017	03			
05-HS-104/C	CLOSE SHIPPING/RECEIVING - NDE/NDA ISOLATION DOOR	DO	O:024/01	N95	024	01			
05-HS-104/O	OPEN SHIPPING/RECEIVING - NDE/NDA ISOLATION DOOR	DO	O:024/02	N95	024	02			
PLC To AGV									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N20	0				
5.5.1	REQUEST STATUS OF AGV SYSTEM	NETCOM							
5.5.2	REQUEST LOCATION OF AN AGV	NETCOM							
	AGV TO GET LOCATION OF			N20	4				
5.5.4	S/R/NDE/NDA DOOR IS OPEN	NETCOM							
5.5.5	REQUEST TRANSPORT QUEUE OF AGV SYSTEM	NETCOM							
	AGV TO GET QUEUE OF			N20	20				
5.5.6	DISABLE ALL AGV MOVEMENT	NETCOM							
	AGV TO DISABLE			N20	22				
5.5.7	ENABLE ALL AGV MOVEMENT	NETCOM							
	AGV TO ENABLE			N20	24				
5.5.8	STATUS OF PCS SYSTEM	NETCOM							
	EQUIP. STATUS VALUE			N20	26-27				
	SOFTWARE ERROR CODE			N20	28				
	EQUIP. STATUE MESSAGE			N20	29-60				
5.5.10	ADVANCE AGV AT GLOVEBOX HOLD_POINT LOCATION								
	AGV TO ADVANCE	NETCOM							
AGV To PLC									
	PCS TO PLC MESSAGE RECEIVED			B3		2			
5.6.1	STATUS OF AGV SYSTEM	NETCOM							
	STATUS VALUE			N20	61-62				
	SOFTWARE ERROR CODE			N20	63				
	STATUE MESSAGE			N20	64-95				
5.6.2	LOCATION OF AGV SYSTEM	NETCOM		N20	230	1			
	AGV REPORTING LOCATION			N20	96				
	PICKUP LOCATION			N20	97				
	DROPOFF LOCATION			N20	98				
	ROLLER DECK USING			N20	99				
	WHICH LOCATION IS AGV AT			N20	100				

LCU 101 File 20 PLC Memory Map -- NDE Supervisory

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	# OF DRUMS ON AGV			N20	101				
	ROLLER DECK #1 DRUM PIN			N20	102-109				
	ROLLER DECK #2 DRUM PIN			N20	110-117				
5.6.3	**REQUEST TO OPEN S/R/NDE/NDA DOOR**	NETCOM							
5.6.4	**OK TO CLOSE S/R/NDE/NDA DOOR**	NETCOM							
5.6.5	**TRANSPORT REQUEST RECEIVED CONFIRMATION**	NETCOM							
	AGV TRANSPORTING			N20	118				
	ROLLER DECK DRUM IS ON			N20	119				
	LENGTH OF QUEUE			N20	120				
5.6.6	**TRANSPORT QUEUE LIST IN AGV**	NETCOM							
	AGV REPORTING QUEUE			N20	121				
	QUEUE LENGTH			N20	122				
5.6.7	**AGV TRANSPORT COMMAND**	NETCOM		N20	230	6			
	AGV COMMAND FROM			N20	123				
	DRUM PIN			N20	124-131				
	PICKUP LOCATION			N20	132				
	PICKUP REQUEST OR COMMAND			N20	133				
	DROPOFF LOCATION			N20	134				
	DROPOFF REQUEST OR COMMAND			N20	135				
AGV DRUM DATA TABLES									
	ROLLER DECK #1 - PIN			N208	0-7				
	ROLLER DECK #1 - WEIGHT			N208	8				
	ROLLER DECK #1 - ROUTE			N208	9-10				
	ROLLER DECK #1 - SAMPLE/COMPLIANT			N208	11				
	ROLLER DECK #1 - DRUM PRESENT			N208	12				
	ROLLER DECK #2 - PIN			N208	20-27				
	ROLLER DECK #2 - WEIGHT			N208	28				
	ROLLER DECK #2 - ROUTE			N208	29-30				
	ROLLER DECK #2 - SAMPLE/COMPLIANT			N208	31				
	ROLLER DECK #2 - DRUM PRESENT			N208	32				
PLC To PCS									
	MODULE-TO-SUPV. TRANSMIT (T1) HANDSHAKING BIT			N20	0	0			
	MODULE-TO-SUPV. RECEIVE (T2) HANDSHAKING BIT			N20	0	1			
	MESSAGE SENT TO SUPV.			B3		3			
	*			N201	20	0			
	PLC-TO-PCS MESSAGE BUFFER			N220-N223					
	TRANSMIT MESSAGE INDEX # REGISTER			N220	0				
5.3.22	**REQUEST STATUS OF DMS SYSTEM**			N20	140				
5.3.25	**STATUS OF PCS SYSTEM**								

LCU 101 File 20 PLC Memory Map -- NDE Supervisory

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	EQUIPMENT STATUS VALUE			N70	0-1				
	SOFTWARE ERROR CODE			N70	2				
	STATUS MESSAGE			N70	3-34				
5.5.9	RELEASE AGV (RTAP RESET AGV)			N200	10				
PCS To PLC									
	PCS-TO-PLC RECEIVE (SR1) HANDSHAKING BIT			N200	20	0			
	PCS-TO-PLC MESSAGE SENT (SR2) HANDSHAKING BIT			N200	20	1			
	PCS-TO-PLC MESSAGE BUFFER			N225-N228					
	RECEIVE MESSAGE INDEX # REGISTER			N20	150				
	PCS-TO-PLC MESSAGE LOST			N201	21	0			
	PCS MESSAGE RECEIVED BY MODULE			B3		2			
	MESSAGE RECEIVED BY SUBMODULE			B3		2			
	MESSAGE SENT TO SUPERVISORY CONTROL SUBMODULE			B3		3			
	NETCOMM MESSAGE DESTINATION = RECEIVING			B3		4			
	NETCOMM MESSAGE DESTINATION = SHIPPING			B3		5			
	NETCOMM MESSAGE DESTINATION = INFEED CONVEYOR B			B3		7			
	NETCOMM MESSAGE DESTINATION = NDE/NDA CAROUSEL			B3		8			
	NETCOMM MESSAGE DESTINATION = TRANSFER CONVEYORS			B3		9			
	NETCOMM MESSAGE DESTINATION = BACKGROUND CONVEYORS			B3		10			
	DRUM SCALE A DRUM PIN MISMATCH			B3		11			
	NETCOMM MESSAGE DESTINATION = DISCHARGE CONVEYOR			B3		12			
	NETCOMM MESSAGE DESTINATION = SUPERVISORY CTRL SUBMOD.			B3		13			
	NETCOMM MESSAGE DESTINATION = NDE/NDA			B3		14			
5.4.2	FISSILE INVENTORY LEVEL - TRU GLOVEBOXES								
	CURRENT LEVEL (GRAMS) - TRU			N20	161-162				
	ALARM EXISTING - TRU			N20	163				
5.4.2	FISSILE INVENTORY LEVEL - TRURWM GLOVEBOXES								
	CURRENT LEVEL (GRAMS)			N20	164-165				
	ALARM EXISTING			N20	166				
5.4.12	STATUS OF DMS SYSTEM								
	EQUIPMENT STATUS VALUE			N20	175-176				
	SOFTWARE ERROR CODE			N20	177				
	STATUS MESSAGE			N20	178-209				
5.4.13	STATUS OF SIE SYSTEM								
	EQUIPMENT STATUS VALUE			N20	245-246				
	SOFTWARE ERROR CODE			N20	247				
	STATUS MESSAGE			N20	248-279				
5.4.14	CRITICALITY ALERT			N20	1				
	CONTAINER IDENTIFICATION			N20	210-217				

LCU 101 File 20 PLC Memory Map -- NDE Supervisory

Tag Name	Appendix B	Type	I/O Address	PLC Registers					
				Internal			PLC <--> Ext. Dev.		
				Data File	Word	Bit	Data File	Word	Bit
	ALARM LEVEL			N20	218-219				
	CRITICALITY LOCATION			N20	220				
5.4.15	**REQUEST STATUS OF PCS SYSTEM**								
5.4.17	**FACILITY CURIE LEVEL**								
	DOSAGE EQUIVALENT (CURIES)			N20	221-222				
	ALARM EXISTING			N20	223				
MISCELLANEOUS									
	AIRLOCK_TO_DESTINATION STATUS (FOR LCU_102)								
	NDE_A BUSY			N20	30	0			
	NDE_B BUSY			N20	30	1			
	PAN_A BUSY			N20	30	2			
	PAN_B BUSY			N20	30	3			
	GEA_A BUSY			N20	30	4			
	GEA_B BUSY			N20	30	5			
	DISCHARGE CONV BUSY			N20	30	6			
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
05-ZSO-104/A	**NDE/NDA ISOLATION DOOR FAILED TO OPEN STATUS**			N209	0	0-1			
05-ZSC-104/A	**NDE/NDA ISOLATION DOOR FAILED TO CLOSE STATUS**			N209	0	2-3			
END OF LCU 101 FILE 20 MEMORY MAP									

Appendix C
Local Control Unit 102
Memory Maps

Appendix C
Local Control Unit 102
Memory Maps

Table of Contents

LCU 102 File 30 Memory Map - Airlock & Transfer Conveyors

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS								
AIRLOCK TRANSFER CONVEYOR 103A								
09-HS-211A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:010/00						
09-ZS-211A	AGV HANDSHAKE SIGNAL S1	I:010/02						
09-XS-211A/B	ROPE SWITCH A/B	I:010/01						
09-ZS-211D	AGV SIDE DRUM POSITION SWITCH	I:010/05						
09-ZS-211C	AIRLOCK SIDE DRUM POSITION SWITCH	I:010/04						
CV-09-103A/F	CONVEYOR MOTOR RUN FORWARD	O:040/01						
CV-09-103A/R	CONVEYOR MOTOR RUN REVERSE	O:040/00						
09-ZY-211A	AGV HANDSHAKE SIGNAL S1	O:040/02						
AIRLOCK TRANSFER CONVEYOR 103B								
09-HS-212A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:010/06						
09-ZS-212A	AGV HANDSHAKE SIGNAL S1	I:010/10						
09-XS-212A/B	ROPE SWITCH A/B	I:010/07						
09-ZS-212D	AGV SIDE DRUM POSITION SWITCH	I:010/13						
09-ZS-212C	AIRLOCK SIDE DRUM POSITION SWITCH	I:010/12						
CV-09-103B/F	CONVEYOR MOTOR RUN FORWARD	O:040/05						
CV-09-103B/R	CONVEYOR MOTOR RUN REVERSE	O:040/04						
09-ZY-212A	AGV HANDSHAKE SIGNAL S1	O:040/06						
AIRLOCK DOOR 17 (TRANSFER CONV 103B TO AIRLOCK CONV B)								
09-HS-217A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:012/00						
09-ZSO-217	DOOR 17 OPEN POSITION SWITCH	I:012/03						
09-ZSC-217	DOOR 17 CLOSED POSITION SWITCH	I:012/02						
09-ZS-217	DOOR 17 PASSAGE WAY PHOTOEYE	I:012/01						
09-HS-217B/O	DOOR 17 MOTOR OPEN	O:041/05						
09-HS-217B/C	DOOR 17 MOTOR CLOSE	O:041/04						
AIRLOCK DOOR 18 (TRANSFER CONV 103A TO AIRLOCK CONV A)								
09-HS-251A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:012/04						
09-ZSO-251	DOOR 18 OPEN POSITION SWITCH	I:012/07						
09-ZSC-251	DOOR 18 CLOSED POSITION SWITCH	I:012/06						
09-ZS-251	DOOR 18 PASSAGE WAY PHOTOEYE	I:012/05						

LCU 102 File 30 Memory Map - Airlock & Transfer Conveyors

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
09-HS-251B/0	DOOR 18 MOTOR OPEN	O:041/07						
09-HS-251B/C	DOOR 18 MOTOR CLOSE	O:041/06						
AIRLOCK CONVEYOR 104A								
09-HS-213A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:010/14						
09-XS-213A/B	ROPE SWITCH A/B	I:010/15						
09-ZS-213B	NDE/NDA SIDE DRUM POSITION SWITCH	I:010/17						
09-ZS-213A	PROCESS SIDE DRUM POSITION SWITCH	I:010/16						
CV-09-104A/F	CONVEYOR MOTOR RUN FORWARD	O:040/11						
CV-09-104A/R	CONVEYOR MOTOR RUN REVERSE	O:040/10						
AIRLOCK CONVEYOR 104B								
09-HS-214A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:011/00						
09-XS-214A/B	ROPE SWITCH A/B	I:011/01						
09-ZS-214B	NDE/NDA SIDE DRUM POSITION SWITCH	I:011/03						
09-ZS-214A	PROCESS SIDE DRUM POSITION SWITCH	I:011/02						
CV-09-104B/F	CONVEYOR MOTOR RUN FORWARD	O:040/13						
CV-09-104B/R	CONVEYOR MOTOR RUN REVERSE	O:040/12						
AIRLOCK DOOR 17A (AIRLOCK CONV B TO TRANSFER CONV 201B)								
09-HS-218A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:012/14						
09-ZSO-218	DOOR 17A OPEN POSITION SWITCH	I:012/17						
09-ZSC-218	DOOR 17A CLOSED POSITION SWITCH	I:012/16						
09-ZS-218	DOOR 17A PASSAGE WAY PHOTOEYE	I:012/15						
09-HS-218B/0	DOOR 17A MOTOR OPEN	O:041/13						
09-HS-218B/C	DOOR 17A MOTOR CLOSE	O:041/12						
AIRLOCK DOOR 18A (AIRLOCK CONV A TO TRANSFER CONV 201A)								
09-HS-252A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:012/10						
09-ZSO-252	DOOR 18A OPEN POSITION SWITCH	I:012/13						
09-ZSC-252	DOOR 18A CLOSED POSITION SWITCH	I:012/12						
09-ZS-252	DOOR 18A PASSAGE WAY PHOTOEYE	I:012/11						
09-HS-252B/0	DOOR 18A MOTOR OPEN	O:041/11						
09-HS-252B/C	DOOR 18A MOTOR CLOSE	O:041/10						
AIRLOCK TRANSFER CONV 201A								

LCU 102 File 30 Memory Map - Airlock & Transfer Conveyors

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
09-HS-215A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:011/04						
09-WIT-215	WEIGH SCALE TRANSMITTER		N30	10-12				
09-ZS-215A	AGV HANDSHAKE SIGNAL S1	I:011/06						
09-XS-215A/B	ROPE SWITCH A/B	I:011/05						
09-ZS-215C	AGV SIDE DRUM POSITION SWITCH	I:011/10						
09-ZS-215D	AIRLOCK SIDE DRUM POSITION SWITCH	I:011/11						
CV-09-201A/F	CONVEYOR MOTOR RUN FORWARD	O:040/15						
CV-09-201A/R	CONVEYOR MOTOR RUN REVERSE	O:040/14						
09-ZY-215A	AGV HANDSHAKE SIGNAL S1	O:040/16						
AIRLOCK TRANSFER CONV 201B								
09-HS-216A	LOCAL-OFF-REMOTE (L-O-R) SWITCH	I:011/12						
09-WIT-216	WEIGH SCALE TRANSMITTER		N30	16-18				
09-ZS-216A	AGV HANDSHAKE SIGNAL S1	I:011/14						
09-XS-216A/B	ROPE SWITCH A/B	I:011/13						
09-ZS-216D	AIRLOCK SIDE DRUM POSITION SWITCH	I:011/17						
09-ZS-216C	AGV SIDE DRUM POSITION SWITCH	I:011/16						
CV-09-201B/F	CONVEYOR MOTOR RUN FORWARD	O:041/01						
CV-09-201B/R	CONVEYOR MOTOR RUN REVERSE	O:041/00						
09-ZY-216A	AGV HANDSHAKE SIGNAL S1	O:041/02						
PCS TO DMS								
	SEND MESSAGE TO NETCOM		N30	0	0			
5.3.1	CONTAINER LOCATION UPDATE		N30	0	9			
	DRUM LOCATION		N30	33				
	DRUM PIN		N30	34-41				
5.3.2	CONTAINER LOCATION UPDATE W/ WEIGHT		N30	5	1			
	DRUM LOCATION		N30	122				
	DRUM PIN		N30	123-130				
	CONTAINER WEIGHT		N30	131				
5.5.3	AGV TRANSPORT COMMAND		N30	0	1			
	PICK UP LOCATION		N30	20				
	DROPOFF LOCATION		N30	21				
	DRUM PIN		N30	22-29				
	AGV USING		N30	30				
5.5.9	RELEASE AGV FROM P&D LOCATION		N30	0	14			
	AGV USING		N30	42				

LCU 102 File 30 Memory Map - Airlock & Transfer Conveyors

Tag Name	Description	I/O Address	Internal Register			PLC <---> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
5.5.11	AIRLOCK CONVEYOR STATUS		N30	6	12			
	AIRLOCK CONVEYOR A STATUS (R=REVERSE, F=FORWARD, X=DISABLED/MAINT.		N/A					
	AIRLOCK CONVEYOR B STATUS (R=REVERSE, F=FORWARD, X=DISABLED/MAINT.		N/A					
INTERNAL DRUM TRACKING TABLES								
TRANSFER CONVEYOR CV-09-103A								
	DRUM PIN		N30	50-57				
	WEIGHT		N30	58				
	ROUTE		N30	59-60				
	STATUS		N30	61				
AIRLOCK CONVEYOR CV-09-104A								
	DRUM PIN		N30	62-69				
	WEIGHT		N30	70				
	ROUTE		N30	71-72				
	STATUS		N30	73				
TRANSFER CONVEYOR CV-09-201A								
	DRUM PIN		N30	74-81				
	WEIGHT		N30	82				
	ROUTE		N30	83-84				
	STATUS		N30	85				
TRANSFER CONVEYOR CV-09-103B								
	DRUM PIN		N30	86-93				
	WEIGHT		N30	94				
	ROUTE		N30	95-96				
	STATUS		N30	97				
AIRLOCK CONVEYOR CV-09-104B								
	DRUM PIN		N30	98-105				
	WEIGHT		N30	106				
	ROUTE		N30	107-108				
	STATUS		N30	109				
TRANSFER CONVEYOR CV-09-201B								
	DRUM PIN		N30	110-117				
	WEIGHT		N30	118				
	ROUTE		N30	119-120				
	STATUS		N30	121				
POSITIONS AVAILABLE FOR DROPOFF (NDE/NDA AGV)								
	NDE VAULT A		N30	15	0			
	NDE VAULT B		N30	15	1			
	NDE PAN A		N30	15	2			
	NDE PAN B		N30	15	3			
	DISCHARGE CONVEYOR		N30	15	4			

LCU 102 File 30 Memory Map - Airlock & Transfer Conveyors

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
ALARMS								
(Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
09-XS-211AB/A	E-STOP ROPE SWITCH PULLED - AIRLOCK TRANSFER CONV 103A		N309	00	00-01			
09-XS-212AB/A	E-STOP ROPE SWITCH PULLED - AIRLOCK TRANSFER CONV 103B		N309	00	02-03			
09-XS-213AB/A	E-STOP ROPE SWITCH PULLED - AIRLOCK CONVEYOR 104A		N309	00	04-05			
09-XS-214AB/A	E-STOP ROPE SWITCH PULLED - AIRLOCK CONVEYOR 104B		N309	00	06-07			
09-XS-215AB/A	E-STOP ROPE SWITCH PULLED - AIRLOCK CONVEYOR 201A		N309	00	08-09			
09-XS-216AB/A	E-STOP ROPE SWITCH PULLED - AIRLOCK CONVEYOR 201B		N309	00	10-11			
09-HS-211A/A	AIRLOCK AUTOMATIC MODE INTERRUPTED - AIRLOCK TRANSFER CONV 103A		N309	00	12			
09-HS-212A/A	AIRLOCK AUTOMATIC MODE INTERRUPTED - AIRLOCK TRANSFER CONV 103B		N309	00	13			
	FAILED TO TRANSFER DRUM TO/FROM AGV - 103A		N309	00	14-15			
	TRANSFER CONVEYOR FAILED TO TRANSPORT DRUM - 103A		N309	01	00-01			
	AIRLOCK CONVEYOR FAILED TO TRANSPORT DRUM - 104A		N309	01	02-03			
	TRANSFER CONVEYOR FAILED TO TRANSPORT DRUM - 201A		N309	01	04-05			
	FAILED TO TRANSFER DRUM TO/FROM AGV - 201A		N309	01	06-07			
	FAILED TO TRANSFER DRUM TO/FROM AGV - 201B		N309	01	08-09			
	TRANSFER CONVEYOR FAILED TO TRANSPORT DRUM - 201B		N309	01	10-11			
	AIRLOCK CONVEYOR FAILED TO TRANSPORT DRUM - 104B		N309	01	12-13			
	TRANSFER CONVEYOR FAILED TO TRANSPORT DRUM - 103B		N309	01	14-15			
	FAILED TO TRANSFER DRUM TO/FROM AGV - 103B		N309	02	00-01			
	FAILED TO TRANSFER DRUM TO/FROM AGV - 201B		N309	02	02-03			
09-ZSO-217/A	AIRLOCK DOOR 17 FAILED TO OPEN		N309	02	06-07			
09-ZSO-218/A	AIRLOCK DOOR 17A FAILED TO OPEN		N309	02	08-09			
09-ZSO-251/A	AIRLOCK DOOR 18 FAILED TO OPEN		N309	02	10-11			
09-ZSO-252/A	AIRLOCK DOOR 18A FAILED TO OPEN		N309	02	12-13			
09-ZSC-217/A	AIRLOCK DOOR 17 FAILED TO CLOSE		N309	02	14-15			
09-ZSC-218/A	AIRLOCK DOOR 17A FAILED TO CLOSE		N309	03	00-01			
09-ZSC-251/A	AIRLOCK DOOR 18 FAILED TO CLOSE		N309	03	02-03			
09-ZSC-252/A	AIRLOCK DOOR 18A FAILED TO CLOSE		N309	03	04-05			
09-ZS-217/A	AIRLOCK DOOR 17 PASSAGE WAY OBSTRUCTED		N309	03	06-07			
09-ZS-218/A	AIRLOCK DOOR 17A PASSAGE WAY OBSTRUCTED		N309	03	08-09			
09-ZS-251/A	AIRLOCK DOOR 18 PASSAGE WAY OBSTRUCTED		N309	03	10-11			
09-ZS-252/A	AIRLOCK DOOR 18A PASSAGE WAY OBSTRUCTED		N309	03	12-13			
END OF LCU 102 FILE 30 MEMORY MAP								

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARWIRED TO/FROM PCS								
LLW RWM DRUM LIFT TABLE 201D (NON-COMPLIANT LOADOUT)								
09-HS-227A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS	I:013/01						
09-HS-227B/U	RAISE LIFT TABLE PUSHBUTTON	I:013/03						
09-HS-227B/D	LOWER LIFT TABLE PUSHBUTTON	I:013/02						
09-HS-227C/F	ROLLER CONVEYOR FORWARD PUSHBUTTON	I:013/04						
09-HS-227C/R	ROLLER CONVEYOR REVERSE PUSHBUTTON	I:013/05						
09-HS-227D	LOCAL PUSHBUTTONS ENABLED SWITCH	I:013/06						
09-ZS-227A	AGV HANDSHAKE SIGNAL S1	I:013/07						
09-ZS-227C	LIFT TABLE DOWN OVERTRAVEL	I:013/12						
09-ZS-227D	LIFT TABLE UP OVERTRAVEL	I:013/13						
09-ZS-227E	DRUM AT END OF CONVEYOR	I:013/14						
09-ZS-227F	DRUM UNDER GLOVEBOX PORT	I:013/15						
09-ZS-227G	AGV MATING HEIGHT	I:013/16						
09-XS-227A/B	ROPE SWITCH A/B	I:013/10						
09-ZY-227A	AGV HANDSHAKE SIGNAL S1	O:041/15						
107-LT-09-201D/F	ROLLER CONVEYOR FORWARD	O:042/00						
107-LT-09-201D/R	ROLLER CONVEYOR REVERSE	O:041/17						
07-ZL-227D	DRUM IN POSITION	O:041/16						
LT09201D_SP	LIFT TABLE STOP COMMAND	O:51/00						
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER								
LT-09-201D/P1	GO TO "DRUM CENTERING POSITION" AT NORMAL SPEED					N314	00	00
LT-09-201D/P2	GO TO "LID IN POSITION" AT SLOW SPEED					N314	00	01
LT-09-201D/P3	GO TO "DOOR IN POSITION" AT SLOW SPEED					N314	00	02
LT-09-201D/P4	LOWER TO "DRUM CENTERING POSITION" AT SLOW SPEED					N314	00	03
LT-09-201D/U	RAISE AT NORMAL SPEED					N314	00	05
LT-09-201D/SP	STOP					N314	00	06
LT-09-201D/LP	GO TO "LOWERED" POSITION					N314	00	11
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS								
LT-09-201D/P1S	AT "DRUM CENTERING POSITION"					N315	00	00
LT-09-201D/P2S	AT "LID IN POSITION" POINT					N315	00	01
LT-09-201D/P3S	AT "DOOR IN POSITION" POINT					N315	00	02
LT-09-201D/LPS	AT "LOWERED" POSITION					N315	00	13
PLC TO SERCOM COMMUNICATION REGISTERS								
	SERCOM STATUS REGISTER		N314	6				
	SERCOM INDEX REGISTER		N314	7				
	SERCOM RESPONSE REGISTER		N314	8				
	PLC STATUS REGISTER		N314	9				
	PLC INDEX REGISTER		N314	10				
	PLC COMMAND REGISTER		N314	11				
LLW RWM DRUM LIFT TABLE 201E (COMPLIANT LOADOUT)								

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
09-HS-229A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS	I:014/01						
09-HS-229B/U	RAISE LIFT TABLE PUSHBUTTON	I:014/03						
09-HS-229B/D	LOWER LIFT TABLE PUSHBUTTON	I:014/02						
09-HS-229C/F	ROLLER CONVEYOR FORWARD PUSHBUTTON	I:014/04						
09-HS-229C/R	ROLLER CONVEYOR REVERSE PUSHBUTTON	I:014/05						
09-HS-229D	AGV/PANEL SWITCH	I:014/06						
09-ZS-229A	AGV HANDSHAKE SIGNAL S1	I:014/10						
09-ZS-229C	LIFT TABLE DOWN OVERTRAVEL	I:014/12						
09-ZS-229D	LIFT TABLE UP OVERTRAVEL	I:014/13						
09-ZS-229E	DRUM AT END OF CONVEYOR	I:014/14						
09-ZS-229F	DRUM UNDER GLOVEBOX PORT	I:014/15						
09-ZS-229G	AGV MATING HEIGHT	I:014/16						
09-XS-229A/B	ROPE SWITCH A/B	I:014/07						
09-ZY-229A	AGV HANDSHAKE SIGNAL S1	O:042/03						
107-LT-09-201E/F	ROLLER CONVEYOR FORWARD	O:042/02						
107-LT-09-201E/R	ROLLER CONVEYOR REVERSE	O:042/05						
09-ZL-229D	DRUM IN POSITION	O:042/04						
LT09201E_SP	LIFT TABLE STOP COMMAND	O:51/01						
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER								
LT-09-201E/P1	GO TO "DRUM CENTERING POSITION" AT NORMAL SPEED					N314	01	00
LT-09-201E/P2	GO TO "LID IN POSITION" AT SLOW SPEED					N314	01	01
LT-09-201E/P3	GO TO "DOOR IN POSITION" AT SLOW SPEED					N314	01	02
LT-09-201E/P4	LOWER TO "DRUM CENTERING POSITION" AT SLOW SPEED					N314	01	03
LT-09-201E/SP	STOP					N314	01	06
LT-09-201E/LP	GO TO AGV HEIGHT					N314	01	11
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS								
LT-09-201E/P1S	AT "DRUM CENTERING POSITION"					N315	01	00
LT-09-201E/P2S	AT "LID IN POSITION" POINT					N315	01	01
LT-09-201E/P3S	AT "DOOR IN POSITION" POINT					N315	01	02
PLC TO SERCOM COMMUNICATION REGISTERS								
	SERCOM STATUS REGISTER		N314	12				
	SERCOM INDEX REGISTER		N314	13				
	SERCOM RESPONSE REGISTER		N314	14				
	PLC STATUS REGISTER		N314	15				
	PLC INDEX REGISTER		N314	16				
	PLC COMMAND REGISTER		N314	17				
LLW RWM DRUM LIFT TABLE 201F (BAGLESS TRANSFER PORT)								
09-HS-231A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS	I:015/01						
09-HS-231B/U	RAISE LIFT TABLE PUSHBUTTON	I:015/03						
09-HS-231B/D	LOWER LIFT TABLE PUSHBUTTON	I:015/02						
09-HS-231C/F	ROLLER CONVEYOR FORWARD PUSHBUTTON	I:015/04						

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
09-HS-231C/R	ROLLER CONVEYOR REVERSE PUSHBUTTON	I:015/05						
09-HS-231D	LOCAL PUSHBUTTONS ENABLED SWITCH	I:015/06						
09-ZS-231A	AGV HANDSHAKE SIGNAL S1	I:015/10						
09-ZS-231C	LIFT TABLE DOWN OVERTRAVEL	I:015/12						
09-ZS-231D	LIFT TABLE UP OVERTRAVEL	I:015/13						
09-ZS-231E	DRUM AT END OF CONVEYOR	I:015/14						
09-ZS-231F	DRUM UNDER GLOVEBOX PORT	I:015/15						
09-ZS-231G	AGV MATING HEIGHT	I:015/16						
09-XS-231A/B	ROPE SWITCH A/B	I:015/07						
09-ZY-231A	AGV HANDSHAKE SIGNAL S1	O:042/10						
107-LT-09-201F/F	ROLLER CONVEYOR FORWARD	O:042/12						
107-LT-09-201F/R	ROLLER CONVEYOR REVERSE	O:042/07						
09-ZL-231D	DRUM IN POSITION	O:042/11						
LT09201F_SP	LIFT TABLE STOP COMMAND	O:051/02						
WEIGHT TRANSMITTER REGISTERS								
09-WIT-231	INTEGER VALUE		N31	120				
09-WIT-231	DECIMAL VALUE		N31	121				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER								
LT-09-201F/D	LOWER AT NORMAL SPEED					N314	04	04
LT-09-201F/SP	STOP					N314	04	06
LT-09-201F/BTP	RAISE TO BAGLESS TRANSFER PORT					N314	04	07
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS								
NOT APPLICABLE								
PLC TO SERCOM COMMUNICATION REGISTERS								
	SERCOM STATUS REGISTER		N314	18				
	SERCOM INDEX REGISTER		N314	19				
	SERCOM RESPONSE REGISTER		N314	20				
	PLC STATUS REGISTER		N314	21				
	PLC INDEX REGISTER		N314	22				
	PLC RESPONSE REGISTER		N314	23				
LLW DRUM LIFT TABLE 202A (ENTRY PORT)								
09-HS-233A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS	I:016/01						
09-ZS-233A	AGV HANDSHAKE SIGNAL S1	I:016/10						
09-ZS-233C	LIFT TABLE DOWN OVERTRAVEL	I:016/12						
09-ZS-233D	LIFT TABLE UP OVERTRAVEL	I:016/13						
09-ZS-233E	DRUM AT END OF CONVEYOR	I:016/14						
09-ZS-233F	DRUM UNDER GLOVEBOX PORT	I:016/15						
09-ZS-233G	AGV MATING HEIGHT	I:016/16						
09-XS-233A/B	ROPE SWITCH A/B	I:016/07						
09-ZY-233A	AGV HANDSHAKE SIGNAL S1	O:042/16						
107-LT-09-202A/F	ROLLER CONVEYOR FORWARD	O:042/15						

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
107-LT-09-202A/R	ROLLER CONVEYOR REVERSE	O:043/00						
09-ZL-233D	DRUM IN POSITION	O:042/17						
LT09202A_SP	LIFT TABLE STOP COMMAND	O:050/16						
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER								
LT-09-202A/P1	GO TO "DRUM CENTERING POSITION" AT NORMAL SPEED					N314	02	00
LT-09-202A/P2	GO TO "LID IN POSITION" AT SLOW SPEED					N314	02	01
LT-09-202A/P3	GO TO "DOOR IN POSITION" AT SLOW SPEED					N314	02	02
LT-09-202A/P4	LOWER TO "DRUM CENTERING POSITION" AT SLOW SPEED					N314	02	03
LT-09-202A/D	GO TO AGV HEIGHT					N314	02	04
LT-09-202A/SP	STOP					N314	02	06
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS								
LT-09-202A/P1S	AT "DRUM CENTERING POSITION"					N315	02	00
LT-09-202A/P2S	AT "LID IN POSITION" POINT					N315	02	01
LT-09-202A/P3S	AT "DOOR IN POSITION" POINT					N315	02	02
	AT "AGV HEIGHT"					N314	02	05
PLC TO SERCOM COMMUNICATION REGISTERS								
	SERCOM STATUS REGISTER		N314	24				
	SERCOM INDEX REGISTER		N314	25				
	SERCOM RESPONSE REGISTER		N314	26				
	PLC STATUS REGISTER		N314	27				
	PLC INDEX REGISTER		N314	28				
	PLC COMMAND REGISTER		N314	29				
LLW DRUM LIFT TABLE 202C (EXIT PORT)								
09-HS-237A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS	I:017/01						
09-ZS-237A	AGV HANDSHAKE SIGNAL SI	I:017/10						
09-ZS-237C	LIFT TABLE DOWN OVERTRAVEL	I:017/12						
09-ZS-237D	LIFT TABLE UP OVERTRAVEL	I:017/13						
09-ZS-237E	DRUM AT END OF CONVEYOR	I:017/14						
09-ZS-237F	DRUM UNDER GLOVEBOX PORT	I:017/15						
09-ZS-237G	AGV MATING HEIGHT	I:017/16						
09-XS-237A/B	ROPE SWITCH A/B	I:017/07						
09-ZY-237A	AGV HANDSHAKE SIGNAL SI	O:043/03						
107-LT-09-202C/F	ROLLER CONVEYOR FORWARD	O:043/02						
107-LT-09-202C/R	ROLLER CONVEYOR REVERSE	O:043/05						
09-ZL-237D	DRUM IN POSITION	O:043/07						
LT09202C_SP	LIFT TABLE STOP COMMAND	O:050/15						
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER								
LT-09-202C/P1	GO TO "DRUM CENTERING POSITION" AT NORMAL SPEED					N314	03	00
LT-09-202C/P2	GO TO "LID IN POSITION" AT SLOW SPEED					N314	03	01
LT-09-202C/P3	GO TO "DOOR IN POSITION" AT SLOW SPEED					N314	03	02
LT-09-202C/P4	LOWER TO "DRUM CENTERING POSITION" AT SLOW SPEED					N314	03	03

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
LT-09-202C_U	RAISE LIFT TABLE AT NORMAL SPEED TO AGV HEIGHT					N314	03	05
LT-09-202C/SP	STOP					N314	03	06
LT-09-202C/LPS	GO TO "LOWERED" POSITION					N314	03	11
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS								
LT-09-202C/P1S	AT "DRUM CENTERING POSITION"					N315	03	00
LT-09-202C/P2S	AT "LID IN POSITION" POINT					N315	03	01
LT-09-202C/P3S	AT "DOOR IN POSITION" POINT					N315	03	02
LT-09-202C/LP	AT "LOWERED" POSITION					N315	03	13
PLC TO SERCOM COMMUNICATION REGISTERS								
	SERCOM STATUS REGISTER		N314	30				
	SERCOM INDEX REGISTER		N314	31				
	SERCOM RESPONSE REGISTER		N314	32				
	PLC STATUS REGISTER		N314	33				
	PLC INDEX REGISTER		N314	34				
	PLC COMMAND REGISTER		N314	35				
LLW DRUM LIFT TABLE 203A (RWM TRANSFER PORT)								
09-HS-241A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS	I:020/01						
09-ZS-241A	AGV HANDSHAKE SIGNAL S1	I:020/10						
09-ZS-241C	LIFT TABLE DOWN OVERTRAVEL	I:020/12						
09-ZS-241D	LIFT TABLE UP OVERTRAVEL	I:020/13						
09-ZS-241E	DRUM AT END OF CONVEYOR	I:020/14						
09-ZS-241F	DRUM UNDER GLOVEBOX PORT	I:020/15						
09-ZS-241G	AGV MATING HEIGHT	I:020/16						
09-XS-241A/B	ROPE SWITCH A/B	I:020/07						
09-ZY-241A	AGV HANDSHAKE SIGNAL S1	O:043/06						
107-LT-09-203A/F	ROLLER CONVEYOR FORWARD	O:043/13						
107-LT-09-203A/R	ROLLER CONVEYOR REVERSE	O:043/12						
09-ZL-241D	DRUM IN POSITION	O:043/10						
LT09203A_SP	LIFT TABLE STOP COMMAND	O:050/17						
WEIGHT TRANSMITTER REGISTERS								
09-WIT-241	INTEGER VALUE		N31	123				
09-WIT-241	DECIMAL VALUE		N31	124				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER								
LT-09-203A/D	LOWER AT NORMAL SPEED					N314	05	04
LT-09-203A/SP	STOP					N314	05	06
LT-09-203A/BTP	GO TO BAGLESS TRANSFER PORT					N314	05	12
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS								
PLC TO SERCOM COMMUNICATION REGISTERS								
	SERCOM STATUS REGISTER		N314	36				
	SERCOM INDEX REGISTER		N314	37				
	SERCOM RESPONSE REGISTER		N314	38				

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	PLC STATUS REGISTER		N314	39				
	PLC INDEX REGISTER		N314	40				
	PLC COMMAND REGISTER		N314	41				
BAR CODE SCANNERS								
	PLC TO PCS DISCONNECT BAR CODE LINK					N311	476	0
	PCS TO PLC BAR CODE (BCTS) HANDSHAKING BIT					N310	476	0
	PCS TO PLC BAR CODE (BCTS2) HANDSHAKING BIT					N310	476	1
	TEMPORARY INTERNAL DRUM PIN DATA TABLE					N310	0-12	
	PLC TO PCS BAR CODE TERMINAL ID					N311	218	
	PLC TO PCS BAR CODE MESSAGE LENGTH					N311	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)					N311	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)					N311	236-251	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)					N311	252-267	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)					N311	268-283	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)					N311	284-299	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)					N311	300-315	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)					N311	316-331	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)					N311	332-347	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)					N311	348-363	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)					N311	364-379	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)					N311	380-395	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)					N311	396-411	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)					N311	412-427	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)					N311	428-443	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)					N311	444-459	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)					N311	460-475	
	BAR CODE IS A CONTAINER PIN		N31	10	11			
	TERMINAL #3 LOCATION = LLW_ENTRY		N31	11	0			
	TERMINAL #3 LOCATION = LLW_XFER PORT		N31	11	1			
	TERMINAL #3 LOCATION = LLW_EXIT		N31	11	2			
	TERMINAL #3 LOCATION = LLW_RWM_EXIT 201F		N31	15	0			
	TERMINAL #3 LOCATION = LLW_RWM_EXIT 201E		N31	15	1			
	TERMINAL #3 LOCATION = LLW_RWM_ENTRY		N31	15	2			
	TERMINAL #5 LOCATION = LLW_ENTRY		N31	14	0			
	TERMINAL #5 LOCATION = LLW_XFER PORT		N31	14	1			
	TERMINAL #5 LOCATION = LLW_EXIT		N31	14	2			
	TERMINAL #5 LOCATION = LLW_RWM_EXIT 201F		N31	13	0			
	TERMINAL #5 LOCATION = LLW_RWM_EXIT 201E		N31	13	1			
	TERMINAL #5 LOCATION = LLW_RWM_ENTRY		N31	13	2			
	SCANNER #1 SCANNED VALUE		N31	225-237				
	SCANNER #2 SCANNED VALUE		N31	259-271				

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
DATA TABLES								
	TEMPORARY INTERNAL DRUM PIN DATA TABLE		N310	0-15				
	DRUM DATA BUFFER STORAGE		N31	238-249				
PCS TO DMS								
	SEND MESSAGE TO NETCOM		N31	8	5			
5.3.1	CONTAINER LOCATION UPDATE		N31	5	7			
	DRUM LOCATION		N31	251-218				
	DRUM PIN		N31	250				
5.5.3	AGV TRANSPORT COMMAND		N31	0	4			
	PICK UP LOCATION		N31	20				
	DROPOFF LOCATION		N31	21				
	DRUM PIN		N31	22-29				
5.5.9	RELEASE AGV FROM P&D LOCATION		N31	4	14			
DMS TO PCS								
	DESTINATION = LLW_LIFT		B3		6			
5.4.1	CONTAINER LOCATION UPDATE CONFIRMATION		N31	5	6			
	DRUM LOCATION		N31	215				
	DRUM PIN		N31	216-223				
INTERNAL DRUM TRACKING TABLES								
LIFT TABLE LT-09-202A								
	DRUM PIN		N31	35-42				
	WEIGHT		N31	43				
	ROUTE		N31	44-45				
	STATUS		N31	46				
LIFT TABLE LT-09-203A								
	DRUM PIN		N31	48-55				
	WEIGHT		N31	56				
	ROUTE		N31	57-58				
	STATUS		N31	59				
LIFT TABLE LT-09-202C								
	DRUM PIN		N31	60-67				
	WEIGHT		N31	68				
	ROUTE		N31	69-70				
	STATUS		N31	71				
LIFT TABLE LT-09-201D								
	DRUM PIN		N31	72-79				
	WEIGHT		N31	80				
	ROUTE		N31	81-82				
	STATUS		N31	83				
LIFT TABLE LT-09-201E								
	DRUM PIN		N31	84-91				

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	WEIGHT		N31	92				
	ROUTE		N31	93-94				
	STATUS		N31	95				
LIFT TABLE LT-09-201F								
	DRUM PIN		N31	96-103				
	WEIGHT		N31	104				
	ROUTE		N31	105-106				
	STATUS		N31	107				
ALARMS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
NOTE: The lift table alarms that are annunciated at each OIU are listed within each glovebox file.								
09-XS-227AB/A	LIFT TABLE 201D E-STOP ROPE SWITCH PULLED		N319	00	00-01	N454	10	09
09-XS-229AB/A	LIFT TABLE 201E E-STOP ROPE SWITCH PULLED		N319	00	02-03	N454	07	09
09-XS-231AB/A	LIFT TABLE 201F E-STOP ROPE SWITCH PULLED		N319	00	04-05	N454	03	04
09-XS-233AB/A	LIFT TABLE 202A E-STOP ROPE SWITCH PULLED		N319	00	06-07	N404	07	11
09-XS-237AB/A	LIFT TABLE 202C E-STOP ROPE SWITCH PULLED		N319	00	08-09	N434	07	11
09-XS-241AB/A	LIFT TABLE 203A E-STOP ROPE SWITCH PULLED		N319	00	10-11	N414	07	06
09-ZS-227F/A	LIFT TABLE 201D CONVEYOR FORWARD FAILED		N319	00	12-13	N454	10	05
09-ZS-229F/A	LIFT TABLE 201E CONVEYOR FORWARD FAILED		N319	00	14-15	N454	07	05
09-ZS-231F/A	LIFT TABLE 201F CONVEYOR FORWARD FAILED		N319	01	00-01	N454	03	00
09-ZS-233F/A	LIFT TABLE 202A CONVEYOR FORWARD FAILED		N319	01	02-03	N404	07	12
09-ZS-237F/A	LIFT TABLE 202C CONVEYOR FORWARD FAILED		N319	01	04-05	N434	07	07
09-ZS-241F/A	LIFT TABLE 203A CONVEYOR FORWARD FAILED		N319	01	06-07	N414	07	02
09-ZS-227E/A	LIFT TABLE 201D CONVEYOR REVERSE FAILED		N319	01	08-09	N454	10	06
09-ZS-229E/A	LIFT TABLE 201E CONVEYOR REVERSE FAILED		N319	01	10-11	N454	07	06
09-ZS-231E/A	LIFT TABLE 201F CONVEYOR REVERSE FAILED		N319	01	12-13	N454	03	01
09-ZS-233E/A	LIFT TABLE 202A CONVEYOR REVERSE FAILED		N319	01	14-15	N404	07	08
09-ZS-237E/A	LIFT TABLE 202C CONVEYOR REVERSE FAILED		N319	02	00-01	N434	07	08
09-ZS-241E/A	LIFT TABLE 203A CONVEYOR REVERSE FAILED		N319	02	02-03	N414	07	03
09-ZS-227D/A	LIFT TABLE 201D FAILED TO RAISE		N319	02	04-05	N454	10	07
09-ZS-229D/A	LIFT TABLE 201E FAILED TO RAISE		N319	02	06-07	N454	07	07
09-ZS-231D/A	LIFT TABLE 201F FAILED TO RAISE		N319	02	08-09	N454	03	02
09-ZS-233D/A	LIFT TABLE 202A FAILED TO RAISE		N319	02	10-11	N404	07	09
09-ZS-237D/A	LIFT TABLE 202C FAILED TO RAISE		N319	02	12-13	N434	07	09
09-ZS-241D/A	LIFT TABLE 203A FAILED TO RAISE		N319	02	14-15	N414	07	04
09-ZS-227C/A	LIFT TABLE 201D FAILED TO LOWER		N319	03	00-01	N454	10	08
09-ZS-229C/A	LIFT TABLE 201E FAILED TO LOWER		N319	03	02-03	N454	07	08
09-ZS-231C/A	LIFT TABLE 201F FAILED TO LOWER		N319	03	04-05	N454	03	03
09-ZS-233C/A	LIFT TABLE 202A FAILED TO LOWER		N319	03	05-06	N404	07	10
09-ZS-237C/A	LIFT TABLE 202C FAILED TO LOWER		N319	03	06-07	N434	07	10
09-ZS-241C/A	LIFT TABLE 203A FAILED TO LOWER		N319	03	08-09	N414	07	05

LCU 102 File 31 Memory Map - LLW Lift Tables

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
09-ZS-227C	LIFT TABLE 201D DOWN OVERTRAVEL		N319	03	10-11	N454	10	10
09-ZS-227D	LIFT TABLE 201D UP OVERTRAVEL		N319	03	12-13	N454	10	11
09-ZS-229C	LIFT TABLE 201E DOWN OVERTRAVEL		N319	03	14-15	N454	7	10
09-ZS-229D	LIFT TABLE 201E UP OVERTRAVEL		N319	04	00-01	N454	7	11
09-ZS-231C	LIFT TABLE 201F DOWN OVERTRAVEL		N319	04	02-03	N454	20	00
09-ZS-231D	LIFT TABLE 201F UP OVERTRAVEL		N319	04	04-05	N454	20	01
09-ZS-233C	LIFT TABLE 202A DOWN OVERTRAVEL		N319	04	06-07	N404	07	13
09-ZS-233D	LIFT TABLE 202A UP OVERTRAVEL		N319	04	08-09	N404	07	14
09-ZS-237C	LIFT TABLE 202C DOWN OVERTRAVEL		N319	04	10-11	N434	07	12
09-ZS-237D	LIFT TABLE 202C UP OVERTRAVEL		N319	04	12-13	N434	07	13
09-ZS-241C	LIFT TABLE 203A DOWN OVERTRAVEL		N319	04	14-15	N414	07	07
09-ZS-241D	LIFT TABLE 203A UP OVERTRAVEL		N319	05	00-01	N414	07	08
	LLW GEN EXITS UNAVAILABLE		N319	05	02-03			
	LIFT TABLE LT-09-201F DRUM TRANSFER FAILURE		N319	05	04-05			
	LIFT TABLE LT-09-201E DRUM TRANSFER FAILURE		N319	05	06-07			
	LIFT TABLE LT-09-201D DRUM TRANSFER FAILURE		N319	05	08-09			
	LIFT TABLE LT-09-202A DRUM TRANSFER FAILURE		N319	05	10-11			
	LIFT TABLE LT-09-202C DRUM TRANSFER FAILURE		N319	05	12-13			
	LIFT TABLE LT-09-203A DRUM TRANSFER FAILURE		N319	05	14-15			
	LIFT TABLE LT-09-201D DRUM PIN MISMATCH		N319	06	00-01			
	LIFT TABLE LT-09-201E DRUM PIN MISMATCH		N319	06	02-03			
	LIFT TABLE LT-09-201F DRUM PIN MISMATCH		N319	06	04-05			
	LIFT TABLE LT-09-202A DRUM PIN MISMATCH		N319	06	06-07			
	LIFT TABLE LT-09-202C DRUM PIN MISMATCH		N319	06	08-09			
	LIFT TABLE LT-09-203A DRUM PIN MISMATCH		N319	06	10-11			
	LIFT TABLE LT-09-201D SERVO MOTOR POWER FAIL - REHOME 201D		N319	06	12-13	N454	10	12
	LIFT TABLE LT-09-201E SERVO MOTOR POWER FAIL - REHOME 201E		N319	06	14-15	N454	10	13
	LIFT TABLE LT-09-201F SERVO MOTOR POWER FAIL - REHOME 201F		N319	07	00-01	N454	10	14
	LIFT TABLE LT-09-202A SERVO MOTOR POWER FAIL - REHOME 202A		N319	07	02-03	N404	16	04
	LIFT TABLE LT-09-202C SERVO MOTOR POWER FAIL - REHOME 202C		N319	07	04-05	N434	12	07
	LIFT TABLE LT-09-203A SERVO MOTOR POWER FAIL - REHOME 203A		N319	07	06-07	N414	25	05
END OF LCU 102 FILE 31 MEMORY MAP								

LCU 102 File 34 Memory Map - RWM Drum Carousel

Tag Name	Description	I/O Address	Internal Register			Carousel <--> PCS		
			Data File	Word	Bit	Data File	Word	Bit
PCS TO RWM CAROUSEL								
CV-09-202/ID	DRUM PIN TO BE RETRIEVED		N34	13-20				
CV-09-202/RD	PLC TO CAROUSEL RETRIEVE DRUM COMMAND		N34	3	0			
CV-09-202/SD	PLC TO CAROUSEL STORE DRUM COMMAND		N34	3	1			
RWM CAROUSEL TO PCS								
CV-09-202/DR	DRUM RETRIEVED, READY FOR PICKUP		N34	4	0	N21	0	0
CV-09-202/DS	DRUM STORED		N34	4	1	N21	0	1
CV-09-202/DF	DRUM NOT FOUND		N349	0	0	N21	0	2
CV-09-202/R	LOCAL-OFF-REMOTE (L-O-R) SWITCH IN REMOTE		N34	1	4	N21	0	3
CV-09-202/R	LOCAL-OFF-REMOTE (L-O-R) SWITCH IN LOCAL		N34	1	5	N21	0	4
CV-09-202/CT	CAROUSEL TROUBLE		N349	0	2	N21	0	5
CV-09-202/TF	DRUM TRANSFER FAILURE		N349	0	4	N21	0	6
	DRUM TRANSFER TO AGV COMPLETE		N34	1	10	N21	0	7
	DRUM TRANSFER FROM AGV COMPLETE		N34	1	8	N21	0	8
	RWM CAROUSEL FULL		N349	0	6	N21	0	9
	RWM CAROUSEL INITIALIZING		N34	1	12	N21	0	10
RWM CAROUSEL DRUM TABLES								
	TRU_ENTRY (CATEGORY A) DRUM PINS (2)		N348	0-15				
	LLW_ENTRY (CATEGORY B) DRUM PINS (2)		N348	16-31				
	LLW_EXIT (CATEGORY C1) DRUM PINS		N348	32-39				
	LLW_RWM_EXIT (CATEGORY C2) DRUM PINS (2)		N348	40-47				
	TRU_XFER (CATEGORY D1) DRUM PINS (18)		N348	48-191				
	TRU_SAMPLING (CATEGORY D2) DRUM PINS (18)		N348	192-335				
	TRU_PROCESSING (CATEGORY D3) DRUM PINS (18)		N348	336-479				
	LLW_XFER (CATEGORY D4) DRUM PINS (18)		N348	480-623				
	LLW_SAMPLING (CATEGORY D5) DRUM PINS (18)		N348	624-767				
	LLW_PROCESSING (CATEGORY D6) DRUM PINS (18)		N348	768-911				
	TRU_ENTRY (CATEGORY A) PIN TABLE POINTER		N34	40				
	LLW_ENTRY (CATEGORY B) PIN TABLE POINTER		N34	41				
	TRU_XFER (CATEGORY D1) PIN TABLE POINTER		N34	42				
	TRU_SAMPLING (CATEGORY D2) PIN TABLE POINTER		N34	43				
	TRU_PROCESSING (CATEGORY D3) PIN TABLE POINTER		N34	44				
	LLW_XFER (CATEGORY D4) PIN TABLE POINTER		N34	45				
	LLW_SAMPLING (CATEGORY D5) PIN TABLE POINTER		N34	46				
	LLW_PROCESSING (CATEGORY D6) PIN TABLE POINTER		N34	47				
	RWM CAROUSEL DATA POINTER		N34	48				
	TRU_SAMPLING (CATEGORY D2) P/R STATUS BIT		B3		24-41			
	TRU_PROCESSING (CATEGORY D3) P/R STATUS BIT		B3		42-59			
	LLW_SAMPLING (CATEGORY D5) P/R STATUS BIT		B3		78-95			
	LLW_PROCESSING (CATEGORY D6) P/R STATUS BIT		B3		96-113			
	DRUM DATA TABLE - 24 DRUMS		N347:0-119	(5 WORDS PER DRUM)				

LCU 102 File 34 Memory Map - RWM Drum Carousel

Tag Name	Description	I/O Address	Internal Register			Carousel <--> PCS		
			Data File	Word	Bit	Data File	Word	Bit
			DRUM	INDEX	WEIGHT	ROUTE	STATUS	
			1	N347:0	N347:1	N347:2-3	N347:4	
			2	N347:5	N347:6	N347:7-8	N347:9	
			...	...	...	...	...	
			24	N347:115	N347:116	N347:117-118	N347:119	
PCS TO DMS								
5.3.1	CONTAINER LOCATION UPDATE		N34	0	1			
	DRUM PIN		N34	5-12				
5.5.3	AGV TRANSPORT COMMAND		N34	0	2			
5.5.9	RELEASE AGV FROM P&D LOCATION		N34	0	3			
	RW CAROUSEL READY TO SEND MESSAGE TO NETCOM		N34	0	0			
	SEND MESSAGE TO NETCOM (RW CAROUSEL TI BIT)		N34	0	5			
DMS TO PCS								
	DESTINATION = RW_CAROUSL		B3		7			
5.6.7	AGV TRANSPORT COMMAND RECEIVIED		N34	1	0			
ALARMS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
	DRUM NOT FOUND		N349	00	00-01			
	CAROUSEL TROUBLE		N349	00	02-03			
	DRUM TRANSFER FAILURE		N349	00	04-05			
END OF LCU 102 FILE 34 MEMORY MAP								

LCU 102 File 40 Memory Map - LLW Entry Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS								
ENTRY/EXIT PORT DO-07-101 (PORT 101)								
07-ZSC-700A	PORT LOCKED	I:016/11						
07-ZSC-700B	PORT LOCKED	I:016/17						
07-ZSO-700A	PORT NOT UNLOCKED	I:022/10						
07-ZSO-700B	PORT NOT UNLOCKED	I:022/11						
07-ZSC-701	PORT DOOR ROTATED CLOSED	I:022/12						
07-ZSO-701	PORT DOOR ROTATED OPEN	I:022/13						
07-ZS-703A	PORT DOOR LOWERED CLOSED	I:022/04						
07-ZS-703B	PORT DOOR IN POSITION	I:022/05						
07-ZS-703C	PORT DOOR RAISED OPEN	I:022/06						
07-PS-703	VACUUM PRESENT	I:022/03						
07-ZS-711	DRUM LID IN POSITION	I:022/07						
07-ZSO-712A	CENTERING DEVICE RETRACTED	I:024/00						
07-ZSO-712B	CENTERING DEVICE RETRACTED	I:024/01						
07-FEV-303	EXTEND CENTERING CLAMPS	O:044/15						
07-FEV-700A	LOCK PORT	O:070/01						
07-FEV-700A	UNLOCK PORT	O:070/00						
07-FEV-700B	ROTATE PORT OPEN	O:070/02						
07-FEV-700B	ROTATE PORT CLOSED	O:070/03						
07-FEV-700D	GENERATE VACUUM	O:070/13						
07-FEV-700I	EXTEND LID DETACH	O:071/01						
07-FEV-700I	RETRACT LID DETACH	O:071/00						
07-FEV-700J	LOWER DOOR CLOSED	O:070/16						
07-FEV-700J	RAISE DOOR OPEN	O:070/17						
07-FEV-701A	VENT PRESSURE ON OPEN SIDE OF RAISE/LOWER CYLINDER	O:044/16						
07-FEV-701B	VENT PRESSURE ON CLOSE SIDE OF RAISE/LOWER CYLINDER	O:044/17						
07-FEV-700F	ISOLATE VACUUM ON DRUM LID	O:070/12						
MONORAIL HOIST CR-07-101A (TROLLEY 101)								
PC-07-001	PUSHBUTTON -- MOVE TROLLEY FORWARD	I:021/11						
PC-07-001	PUSHBUTTON -- MOVE TROLLEY REVERSE	I:021/16						
PC-07-001	PUSHBUTTON -- RAISE TROLLEY HOIST	I:021/17						
PC-07-001	PUSHBUTTON -- LOWER TROLLEY HOIST	I:021/04						
07-ZS-702A	TROLLEY POSITION SWITCH A	I:021/01						
07-ZS-702B	TROLLEY POSITION SWITCH B	I:021/02						
07-ZS-702C	TROLLEY HOIST NOT RAISED	I:021/03						
PC-07-001	TROLLEY @ SPHINCTER PORT POSITION LED	O:044/05						
PC-07-001	TROLLEY @ MIDWAY POSITION LED	O:044/06						
PC-07-001	TROLLEY @ ENTRY PORT POSITION LED	O:044/07						
PC-07-001	TROLLEY MOTOR FORWARD & LOW SPEED	O:044/01						
PC-07-001	TROLLEY MOTOR REVERSE & LOW SPEED	O:044/02						

LCU 102 File 40 Memory Map - LLW Entry Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
PC-07-001	TROLLEY MOTOR SPEED 2	O:043/14						
PC-07-001	TROLLEY MOTOR SPEED 3	O:043/15						
PC-07-001	TROLLEY MOTOR SPEED 4	O:043/16						
PC-07-001	TROLLEY MOTOR SPEED 5	O:043/17						
PC-07-001	TROLLEY HOIST RAISED POSITION LED	O:044/10						
PC-07-001	TROLLEY PENDANT ENABLED LED	O:044/04						
CR-07-301A	TROLLEY HOIST MOTOR RAISE	O:044/03						
CR-07-301A	TROLLEY HOIST MOTOR LOWER	O:044/00						
DRUM LIFTER DH-07-101 (DRUM LIFTER 101)								
PC-07-001	PUSHBUTTON -- OPEN DRUM LIFER	I:020/03						
PC-07-001	PUSHBUTTON -- CLOSE DRUM LIFER	I:020/02						
07-ZSO-704	DRUM LIFTER OPENED	I:022/01						
07-ZSC-704	DRUM LIFTER CLOSED	I:022/00						
PC-07-001	DRUM LIFTER OPENED INDICATOR	O:044/14						
PC-07	DRUM LIFTER CLOSED INDICATOR	O:044/13						
07-FEV-700C	OPEN DRUM LIFTER	O:070/04						
07-FEV-700C	CLOSE DRUM LIFTER	O:070/05						
DRUM TRANSFER PORT DO-07-102 (PORT 102)								
07-PSLL-701	DOOR SEAL DEFLATED	I:022/15						
07-PSL-700	DOOR SEAL INFLATED	I:022/14						
07-ZSC-705	DOOR CLOSED	I:022/16						
07-ZSO-705	DOOR OPENED	I:022/17						
07-FEV-700E	OPEN DOOR	O:070/11						
07-FEV-700E	CLOSE DOOR	O:070/10						
07-FEV-700G	ISOLATE DOOR SEAL PRESSURE	O:070/14						
07-FEV-700H	INFLATE SEAL	O:071/03						
07-FEV-700H	DEFLATE SEAL	O:071/02						
STAND ALONE INSTRUMENTS								
07-PDISL-333	LOW GLOVEBOX DIFFERENTIAL PRESSURE	I:023/00						
12-NE-310	PORTABLE BAR CODE SCANNER (TERMINAL 3)							
12-NE-313	PORTABLE BAR CODE SCANNER (TERMINAL 5)							
07-ZS-710	TRANSFER CAR NOT AT ENTRY POSITION (UNDER TRANSFER PORT)	I:023/04						
07-ZS-331	DRUM IN POSITION ON TRANSFER CAR	I:022/02						
07-HS-101A	LOCAL EMERGENCY STOP	I:023/02						
07-HS-101B	LOCAL EMERGENCY STOP	I:023/01						
07-PDA-333	LOW DIFFERENTIAL PRESSURE WARNING BEACON PERMISSIVE	O:045/00						
07-FEV-375A	PNEUMATIC VALVE MANIFOLD SP.101 80 PSI AIR SUPPLY	O:045/02						
07-FEV-375B	PNEUMATIC VALVE MANIFOLD SP.101 20 PSI AIR SUPPLY	O:045/01						
DMS PEDESTAL POINTS TE-12-103								
07-HS-315	LLW PROCESS G.B. SUITE EMERGENCY STOP	I:025/06						
07-HS-316	LLW ENTRY GLOVEBOX AUTO MODE/MAINTENANCE MODE SELECT	I:023/05						

LCU 102 File 40 Memory Map - LLW Entry Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
PCS TO DMS								
5.3.4	OVERPACK DRUM CONTAMINATION STATUS		N40	8	4			
	DRUM LOCATION (ENUMERATION = 196)		N40	20				
	DRUM PIN		N40	21-28				
	STATUS (0=CLEAN, 1 =CONTAMINATED)		N40	29				
	SEND MESSAGE TO NETCOM		N40	8	3			
ENTRY DRUM TRACKING TABLE								
	DRUM PIN		N40	50-57				
	WEIGHT		N40	58				
	ROUTE		N40	59-60				
	DRUM STATUS		N40	61				
ALARMS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
07-PS-703	PORT (101) LOSS OF VACUUM ON LID		409	0	06-07	N404	7	00
VARIOUS	PORT (101) FAILED TO OPEN		409	0	02-03	N404	7	01
07-HS-315	EMERGENCY STOP RESET REQUIRED					N404	7	02
07-ZS-702A/702B	TROLLEY FAILED TO REACH ENTRY		409	0	10-11	N404	7	03
VARIOUS	PORT (101) FAILED TO CLOSE AND LOCK		409	0	00-01	N404	7	04
07-ZSC-700A/700	PORT (101) CLOSE AND LOCK NOT VERIFIED		409	0	04-05	N404	7	05
07-ZS-703B	PORT (101) DOOR IN POSITION NOT VERIFIED					N404	7	07
09-ZS-233E/A	LIFT TABLE (202A) CONVEYOR REVERSE FAILED		319	1	14-15	N404	7	08
09-ZS-233D/A	LIFT TABLE (202A) FAILED TO RAISE		319	2	10-11	N404	7	09
09-ZS-233C/A	LIFT TABLE (202A) FAILED TO LOWER		319	3	04-05	N404	7	10
09-XS-233AB/A	LIFT TABLE (202A) ROPE SWITCH PULLED		319	0	06-07	N404	7	11
09-ZS-233F/A	LIFT TABLE (202A) CONVEYOR FORWARD FAILED		319	1	02-03	N404	7	12
09-ZS-233C	LIFT TABLE (202A) DOWN OVERTRAVEL		319	4	06-07	N404	7	13
09-ZS-233D	LIFT TABLE (202A) UP OVERTRAVEL		319	4	08-09	N404	7	14
	"SPARE"					N404	10	00
07-ZSO-712A/712	PORT (101) CENTERING DEVICE ABNORMAL POSITION					N404	10	01
	"SPARE"					N404	10	02
	"SPARE"					N404	10	03
	"SPARE"					N404	10	04
07-ZS-702C	DRUM LIFTER FAILED TO RAISE		409	0	08-09	N404	13	00
07-ZSC-704	DRUM LIFTER FAILED TO CLOSE		409	1	00-01	N404	13	01
07-ZS-702A/702B	TROLLEY FAILED TO REACH MIDWAY		409	0	12-13	N404	13	02
07-ZS-702A/702B	TROLLEY FAILED TO REACH TRANSFER PORT		409	0	14-15	N404	13	03
07-HS-101A/101B	EMERGENCY STOP ACTIVATED		439	1	06-07	N404	13	04
	"SPARE"					N404	16	00
	"SPARE"					N404	16	01
07-ZSC-705	TRANSFER PORT (102) FAILED TO CLOSE		409	1	04-05	N404	16	02
07-PSL-700	TRANSFER PORT (102) SEAL PRESSURE LOST		409	1	02-03	N404	16	03

LCU 102 File 40 Memory Map - LLW Entry Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
LT-09-202A	SERVO MOTOR POWER FAIL - REHOME (202A)					N404	16	04
END OF LCU 102 FILE 40 MEMORY MAP								

LCU 102 File 41 Memory Map - LLW Sorting Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS								
SORTING TABLE ST-07-101								
07-ZS-716A	SORT TABLE LOWERED	I:027/04						
07-ZS-716B	SORT TABLE LOWERED	I:027/05						
07-ZS-717A	SORT TABLE FULLY FORWARD	I:027/06						
07-ZS-717B	SORT TABLE TIP POSITION	I:027/07						
07-ZS-717C	SORT TABLE FULLY RETRACTED	I:027/10						
07-ZS-729A	SORT TABLE LOCKED	I:027/11						
07-ZS-729B	SORT TABLE LOCKED	I:027/12						
07-FEV-737C/R	RAISE SORT TABLE	O:072/05						
07-FEV-737C/L	LOWER SORT TABLE	O:072/04						
07-FEV-737D/L	LOCK SORT TABLE	O:072/06						
07-FEV-737D/UN	UNLOCK SORT TABLE	O:072/07						
07-FEV-737B/F	EXTEND SORT TABLE	O:072/02						
07-FEV-737B/R	RETRACT SORT TABLE	O:072/03						
PACKET TRAY DOOR DO-07-103								
07-ZS-334A	PACKET SHIELD DOOR CLOSED	I:025/15						
07-ZS-334B	PACKET SHIELD DOOR CLOSED	I:025/16						
07-FEV-737H/F	OPEN PACKET TRAY DOOR	O:073/00						
07-FEV-737H/R	CLOSE PACKET TRAY DOOR	O:073/01						
07-FEV-737I/E	EXTEND PACKET X-RAY TRAY	O:072/17						
07-FEV-737I/R	RETRACT PACKET X-RAY TRAY	O:072/16						
ND-07-101/ES	PACKET X-RAY IN PROGRESS	I:31/17						
ND-07-101/EN	NOT PCS CONTROLLED (DOOR SWITCH HARD-WIRED TO X-RAY CONTROLLER)							
DRUM TIPPER DH-07-103								
07-ZS-720A	DRUM TIPPER DRUM GRAB CLOSED	I:025/12						
07-ZS-720B	DRUM TIPPER DRUM GRAB OPEN	I:025/13						
07-ZS-333	DRUM TIPPER NOT VERTICAL	I:025/11						
07-ZS-332A	DRUM GRAB/TIPPER NOT RAISED	I:025/07						
07-ZS-332B	DRUM GRAB/TIPPER NOT LOWERED	I:025/10						
07-ZS-335	DRUM TIPPER CLUTCH TRIPPED	I:025/14						
DH-07-103M1/SU	DRUM TIPPER MOTOR RAISE	O:046/16						
DH-07-103M1/SD	DRUM TIPPER MOTOR LOWER	O:046/15						
07-FEV-395D/O	OPEN DRUM TIPPER GRAB	O:047/00						
07-FEV-395D/C	CLOSE DRUM TIPPER GRAB	O:046/17						
107-HU-07-301/R	DRUM TIPPER JOY STICK ROTATE PERMISSIVE	O:40/03						
07-ZS-719B	DELID/LID FIXTURE AT TIP POSITION	I:027/00						
07-FSL-378	DELID/LID FIXTURE INERT GAS PURGE LOW FLOW	I:027/02						
07-PSL-378	DELID/LID FIXTURE INERT GAS PURGE CYLINDER LOW PRESSURE	I:027/03						
07-FEV-736C/L	DELID/LID FIXTURE LOWER DRUM FILL GUARD	O:074/04						
07-FEV-736B/C	DELID/LID FIXTURE ROTATE CLOCKWISE	O:074/03						

LCU 102 File 41 Memory Map - LLW Sorting Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
07-FEV-736B/CC	DELID/LID FIXTURE ROTATE COUNTER-CLOCKWISE	O:074/02						
07-FEV-737A/F	DELID/LID FIXTURE FORWARD (TOWARDS DELID)	O:072/00						
07-FEV-737A/R	DELID/LID FIXTURE REVERSE (TOWARDS DEBAG/CRIMP)	O:072/01						
07-FEV-736D/E	DELID/LID FIXTURE EXTEND SAW	O:075/02						
07-FEV-736D/R	DELID/LID FIXTURE RETRACT SAW	O:075/02						
07-FEV-736E/V	DELID/LID FIXTURE GENERATE VACUUM	O:074/10						
07-FEV-736E/R	DELID/LID FIXTURE RELEASE VACUUM	O:074/11						
07-FEV-736A/R	DELID/LID FIXTURE RAISE	O:074/01						
07-FEV-736A/L	DELID/LID FIXTURE LOWER	O:074/00						
07-PEV-716	DELID/LID FIXTURE ISOLATE VACUUM	O:047/07						
07-FEV-378A	DELID/LID FIXTURE ENERGIZE SAW	O:047/12						
07-FEV-378B	DELID/LID FIXTURE SUPPLY INERT GAS PURGE	O:047/13						
DRUM EXIT PORT DO-07-105								
DO-07-105/CS	BAGLESS TRANSFER PORT - PORT CLOSED	I:16/02						
DO-07-105/OS	BAGLESS TRANSFER PORT - PORT OPEN	I:16/03						
DO-07-201/C	BAGLESS TRANSFER PORT - OPEN/CLOSE	O:50/10						
DRUM TRANSFER CAR TC-07-101								
07-ZS-718A	DRUM TRANSFER CAR CONVEYOR DRIVE ENGAGED	I:027/13						
07-ZS-718B	DRUM TRANSFER CAR CONVEYOR DRIVE DISENGAGED	I:027/14						
07-ZS-725A	DRUM XFER CAR DECEL & CAR AT COMPACTOR XFER POS.	I:027/15						
07-ZS-725B	DRUM TRANSFER CAR, DECELERATE & CAR AT RELID POS.	I:027/16						
07-ZS-725C	DRUM TRANSFER CAR, DECEL. & CAR AT DRUM DELID POS.	I:027/17						
07-FEV-737E/EN	DRUM TRANSFER CAR CONVEYOR DRIVE ENGAGE	O:072/10						
07-FEV-737E/DE	DRUM TRANSFER CAR CONVEYOR DRIVE DISENGAGE	O:072/11						
07-FEV-737F/F	DRUM TRANSFER CAR FORWARD	O:073/02						
07-FEV-737J/R	DRUM TRANSFER CAR REVERSE	O:073/03						
07-FEV-737G	DRUM TRANSFER CAR DECELERATE	O:072/14						
	DRUM TRANSFER CAR RAISE STOPS	O:072/12						
TC-07-101/ST	DRUM TRANSFER CAR CONVEYOR DRIVE	O:047/14						
STAND ALONE INSTRUMENTS								
07-PDISL-341	LOW DIFFERENTIAL PRESSURE	I:026/03						
07-HS-102A	LOCAL EMERGENCY STOP	I:026/05						
07-HS-102B	LOCAL EMERGENCY STOP	I:026/06						
07-HS-102C	LOCAL EMERGENCY STOP	I:026/17						
07-HS-102D	LOCAL EMERGENCY STOP	I:026/04						
12-NE-310	PORTABLE BAR CODE SCANNER (TERMINAL 3)							
12-NE-313	PORTABLE BAR CODE SCANNER (TERMINAL 5)							
07-ZS-715A	MANIPULATOR PARKED AT POSITION 1	I:025/17						
07-ZS-715B	MANIPULATOR PARKED AT POSITION 2	I:026/00						
07-ZS-715C	MANIPULATOR ARM PARKED	I:026/01						
07-ZS-715D	MANIPULATOR ARM PARKED	I:026/02						

LCU 102 File 41 Memory Map - LLW Sorting Glovebox

Tag Name	Description	I/O Address	Internal Register Data File	Word	Bit	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
07-FEV-376A	PNEUMATIC VALVE MANIFOLD AIR SUPPLY	O:047/11						
07-FEV-376B	PNEUMATIC VALVE MANIFOLD AIR SUPPLY	O:046/13						
07-FEV-377	BAGLESS TRANSFER PORT CONTROLLER AIR SUPPLY	O:046/14						
07-PDA-341	LOW DIFFERENTIAL PRESSURE WARNING BEACON PERMISSIVE	O:047/06						
DMS PEDESTAL POINTS TE-12-103								
07-HS-315	LLW PROCESS G.B. SUITE EMERGENCY STOP	I:025/06						
07-HS-317	LLW SORTING GLOVEBOX AUTO MODE/MAINTENANCE MODE SELECT	I:030/00						
BAR CODE								
	PLC TO PCS DISCONNECT BAR CODE LINK					N411	476	0
	PCS TO PLC BAR CODE (BCTS) HANDSHAKING BIT					N410	476	0
	PCS TO PLC BAR CODE (BCTS2) HANDSHAKING BIT					N410	476	1
	PCS TO PLC BAR CODE COMMAND REGISTER					N410	0-12	
	TEMPORARY INTERNAL DRUM PIN DATA TABLE					N41	20-32	
	PLC TO PCS BAR CODE TERMINAL ID					N411	218	
	PLC TO PCS BAR CODE MESSAGE LENGTH					N411	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)					N411	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)					N411	236-251	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)					N411	252-267	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)					N411	268-283	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)					N411	284-299	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)					N411	300-315	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)					N411	316-331	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)					N411	332-347	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)					N411	348-363	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)					N411	364-379	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)					N411	380-395	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)					N411	396-411	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)					N411	412-427	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)					N411	428-443	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)					N411	444-459	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)					N411	460-475	
	BAR CODE IS A PIN		N41	10	15			
	BAR CODE IS A NON-COMPLIANT ITEM / PACKET PIN		N41	10	11			
	BAR CODE IS A SAMPLE PIN		N41	10	12			
	BAR CODE IS A PURGE PORT PIN		N41	10	13			
	BAR CODE IS A TRANSFER PIG PIN		N41	10	14			
	TERMINAL #3 LOCATION = LLW SORTING GLOVEBOX		N41	10	0			
	TERMINAL #3 LOCATION = LLW PURGE PORT		N41	10	2			
	TERMINAL #5 LOCATION = LLW SORTING GLOVEBOX		N41	10	1			
	TERMINAL #5 LOCATION = LLW PURGE PORT		N41	10	3			

LCU 102 File 41 Memory Map - LLW Sorting Glovebox

Tag Name	Description	I/O Address	Internal Register Data File	Word	Bit	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
PCS TO DMS								
	SEND MESSAGE TO NETCOM		N41	9	2			
5.3.1	CONTAINER LOCATION UPDATE		N41	9	1			
5.3.5	RW PACKET AND TRANSFER DRUM RELATIONSHIP		N41	9	5			
5.3.6	RW PACKET AND PARENT DRUM RELATIONSHIP		N41	9	6			
5.3.7	PURGE PORT LOCATION UPDATE		N41	9	7			
5.3.8	SAMPLE AND PARENT DRUM / PACKET RELATIONSHIP		N41	9	8			
5.3.9	SAMPLE AND PURGE PORT RELATIONSHIP		N41	9	9			
5.3.10	PURGE PORT AND TRANSFER PIG RELATIONSHIP		N41	9	10			
INTERNAL DRUM TRACKING TABLES								
TRANSFER CAR TRACKING TABLE								
	DRUM PIN		N41	50-57				
	WEIGHT		N41	58				
	DRUM ROUTE		N41	59-60				
	STATUS		N41	61				
DRUM TIPPER TRACKING TABLE								
	DRUM PIN		N41	62-69				
	WEIGHT		N41	70				
	DRUM ROUTE		N41	71-72				
	STATUS		N41	73				
SORTING TABLE TRACKING TABLE								
	DRUM PIN		N41	127-134				
	WEIGHT		N41	135				
	DRUM ROUTE		N41	136-137				
	STATUS		N41	138				
PACKET PIN TRACKING TABLE								
	RW PACKET PIN		N41	33-40				
	SAMPLE PIN		N41	41-48				
	PURGE PORT PIN		N41	80-87				
	TRANSFER PIG PIN		N41	88-95				
ALARMS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
VARIOUS	PORT (105) FAILED TO OPEN		N414	07	00			
VARIOUS	PORT (105) FAILED TO CLOSE		N414	07	01			
07-ZS-241F	LIFT TABLE (203A) CONVEYOR FORWARD FAILED		N414	07	02	N319	1	6
07-ZS-241E	LIFT TABLE (203A) CONVEYOR REVERSE FAILED		N414	07	03	N319	2	2
07-WIT-241	LIFT TABLE (203A) FAILED TO RAISE		N414	07	04	N319	2	14
09-ZS-241C/A	LIFT TABLE (203A) FAILED TO LOWER		N414	07	05	N319	3	8
09-XS-241AB/A	LIFT TABLE (203A) ROPE SWITCH PULLED		N414	07	06	N319	0	10
09-ZS-241C	LIFT TABLE (203A) DOWN OVERTRAVEL		N414	07	07	N319	4	14
09-ZS-241D	LIFT TABLE (203A) UP OVERTRAVEL		N414	07	08	N319	5	0

LCU 102 File 41 Memory Map - LLW Sorting Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
07-ZS-725C	TRANSFER CAR FAILED TO REACH DELID POSITION		N414	10	00	N419	3	10
07-ZS-725B	TRANSFER CAR FAILED TO REACH RELID POSITION		N414	10	01	N419	3	12
07-ZS-718A	TRANSFER CAR FAILED TO ENGAGE		N414	10	02	N419	4	2
07-ZS-718B	TRANSFER CAR FAILED TO DISENGAGE		N414	10	03	N419	4	4
07-ZS-725A	TRANSFER CAR FAILED TO REACH COMPACT TRANSFER		N414	10	04	N419	3	14
07-ZS-710	TRANSFER CAR FAILED TO REACH ENTRY		N414	10	05	N419	3	8
07-ZS-725A	TRANSFER CAR FAILED TO REACH COMPACT TRANSFER FROM ENTRY		N414	10	06	N419	4	0
07-ZS-720A	DRUM TIPPER GRAB FAILED TO CLOSE		N414	13	00	N419	1	8
07-ZS-720B	DRUM TIPPER GRAB FAILED TO OPEN		N414	13	01	N419	1	10
07-ZS-335	DRUM TIPPER CLUTCH TRIPPED		N414	13	02	N419	1	6
07-ZS-332B	DRUM TIPPER FAILED TO LOWER		N414	13	03	N419	1	14
07-ZS-332A	DRUM TIPPER FAILED TO RAISE		N414	13	04	N419	1	12
	"SPARE"		N414	16	00			
	"SPARE"		N414	16	01			
	"SPARE"		N414	16	02			
	"SPARE"		N414	16	03			
07-ZS-726A	FIXTURE FAILED TO RAISE		N414	16	04	N419	2	0
07-ZS-726A	FIXTURE FAILED TO LOWER		N414	16	05	N419	2	2
07-ZS-728B	FIXTURE FAILED TO MOVE TO DELID POSITION		N414	16	06	N419	2	6
07-PS-716	FIXTURE VACUUM LOST		N414	16	07	N419	4	8
07-ZS-728A	FIXTURE FAILED TO MOVE TO RELID/PARK POSITION		N414	16	08	N419	2	4
07-PSL-378	FIXTURE INERT GAS LOW PRESSURE		N414	19	00	N419	3	4
07-FSL-378	FIXTURE INERT GAS LOW FLOW		N414	19	01	N419	3	6
07-ZS-724A	FIXTURE SAW FAILED TO EXTEND		N414	19	02	N419	2	8
07-ZS-724B	FIXTURE SAW FAILED TO RETRACT		N414	19	03	N419	2	10
07-ZS-717A	SORTING TABLE FAILED TO MOVE TO FULLY FORWARD		N414	22	00	N419	0	4
07-ZS-717C	SORTING TABLE FAILED TO MOVE TO FULLY RETRACT		N414	22	01	N419	0	8
	"SPARE"		N414	22	02			
07-ZS-729A/B	SORTING TABLE FAILED TO LOCK		N414	22	03	N419	0	0
07-ZS-729A/B	SORTING TABLE FAILED TO UNLOCK		N414	22	04	N419	0	2
07-ZS-717A	SORTING TABLE AT FORWARD POSITION NOT VERIFIED		N414	22	05	N419	0	12
07-ZS-717B	SORTING TABLE AT TIP POSITION NOT VERIFIED		N414	22	06	N419	0	14
07-ZS-717C	SORTING TABLE RETRACTED NOT VERIFIED		N414	22	07	N419	1	0
07-HS-315	EMERGENCY STOP RESET REQUIRED		N414	22	08	N439	1	6
07-PS-395D	DII-07-103 DRUM TIPPER LOSS OF PRESSURE		N414	22	09	N419	4	14
07-ZS-717B	SORTING TABLE FAILED TO MOVE TO TIP POSITION		N414	22	10	N419	0	6
07-HS-102A,B,C,	EMERGENCY STOP ACTIVATED		N414	25	00			
	"SPARE"		N414	25	01			
07-ZS-334A	PACKET X-RAY DOOR FAILED TO OPEN		N414	25	02	N419	1	4
	"SPARE"		N414	25	03			
07-ZS-334B	PACKET X-RAY DOOR FAILED TO CLOSE		N414	25	04	N419	1	2

LCU 102 File 41 Memory Map - LLW Sorting Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
LT-09-203A	SERVO MOTOR POWER FAILURE - REHOME (203A)		N414	25	05			
END OF LCU 102 FILE 41 MEMORY MAP								

LCU 102 File 42 Memory Map - LLW Supercompactor Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS								
	PREPARE TO CARRY OUT OVERALL COMPACTION CYCLE							
SUPERCOMPACTOR TO PCS								
	READY TO CARRY OUT OVERALL COMPACTION CYCLE							
	DRUM RECEIVED							
	COMPACTION SYSTEM FAULT; PROCESS CONTINUING							
	COMPACTION SYSTEM FAULT; PROCESS STOPPED							
PCS TO DMS								
	SEND MESSAGE TO NETCOM		N42	0	3			
5.3.1	CONTAINER LOCATION UPDATE		N42	0	1			
ALARMS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
	COMPACTION SYSTEM FAULT; PROCESS CONTINUING					N429	00	00-01
	COMPACTION SYSTEM FAULT; PROCESS STOPPED					N429	00	02-03
END OF LCU 102 FILE 42 MEMORY MAP								

LCU 102 File 43 Memory Map - LLW Exit Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS								
DRUM ENTRY/EXIT PORT DO-07-106								
07-ZSC-765A	DRUM PORT CLOSED AND LOCKED	I:024/17				N95	24	15
07-ZSC-765B	DRUM PORT CLOSED AND LOCKED	I:025/00				N95	25	00
07-ZSC-760	DOOR DOWN	I:024/14				N95	24	12
07-ZSO-760	DRUM PORT ROTATED	I:025/01				N95	25	01
07-ZS-761A	DRUM DOOR CLOSED	I:024/11				N95	24	9
07-ZS-761B	DRUM DOOR IN POSITION	I:024/12				N95	24	10
07-ZS-761C	DRUM DOOR OPEN	I:024/13				N95	24	11
07-PS-704	SYSTEM ESTABLISHED ADEQUATE VACUUM	I:024/15				N95	24	13
07-ZS-764	DRUM LID IN POSITION	I:024/16				N95	24	14
07-ZSO-767A	DRUM ENTRY/EXIT PORT CENTERING RETRACTED	I:032/04				N95	32	04
07-ZSO-767B	DRUM ENTRY/EXIT PORT CENTERING RETRACTED	I:032/05				N95	32	05
07-PS-768	DRUM ENTRY/EXIT PORT SEAL LOST	I:032/06				N95	32	06
07-FEV-304	DRUM CENTERING	O:046/07				N95	46	07
07-FEV-761A/L	DRUM EXIT/ENTRY PORT LOCK	O:076/01				N95	76	01
07-FEV-761A/UN	DRUM EXIT/ENTRY PORT UNLOCK	O:076/00				N95	76	00
07-FEV-761B/O	DRUM EXIT/ENTRY PORT OPEN	O:076/02				N95	76	02
07-FEV-761B/C	DRUM EXIT/ENTRY PORT CLOSED	O:076/03				N95	76	03
07-FEV-761D/V	DRUM EXIT/ENTRY PORT DRUM LID REMOVAL SYSTEM VACUUM	O:076/06				N95	76	06
07-FEV-761E/E	DRUM EXIT/ENTRY PORT LID DETACH EXTEND	O:076/11				N95	76	11
07-FEV-761E/R	DRUM EXIT/ENTRY PORT LID DETACH RETRACT	O:076/10				N95	76	10
07-FEV-761F/C	DRUM EXIT/ENTRY PORT DOOR CLOSE	O:076/12				N95	76	12
07-FEV-761F/O	DRUM EXIT/ENTRY PORT DOOR OPEN	O:076/13				N95	76	13
07-FEV-762A	ENTRY/EXIT PORT DOOR CLOSE PRESSURE VENT	O:046/10				N95	46	8
07-FEV-762B	ENTRY/EXIT PORT DOOR OPEN PRESSURE VENT	O:046/11				N95	46	9
07-FEV-761C	DRUM ENTRY/EXIT PORT VACUUM ISOLATION	O:076/04				N95	76	04
07-FEV-305	HVAC CONTROL SEAL OPEN/CLOSE	O:043/04				N95	43	04
COMPACT CONVEYOR CV-07-101/MI								
07-ZS-762	END OF COMPACTOR CONVEYOR	I:024/06				N95	24	06
CV-07-101/M1	COMPACT CONVEYOR	O:046/03				N95	46	03
MONORAIL HOIST CR-07-101D								
PC-07-004/FLS	TROLLEY FORWARD & LOW SPEED	I:023/17				N95	23	15
PC-07-004/F2S	TROLLEY FORWARD - SPEED 2	I:023/13				N95	23	11
PC-07-004/F3S	TROLLEY FORWARD - SPEED 3	I:023/14				N95	23	12
PC-07-004/F4S	TROLLEY FORWARD - SPEED 4	I:023/15				N95	23	13
PC-07-004/F5S	TROLLEY FORWARD - SPEED 5	I:023/16				N95	23	14
PC-07-004/RLS	TROLLEY REVERSE & LOW SPEED	I:024/04				N95	24	04
PC-07-004/R2S	TROLLEY REVERSE - SPEED 2	I:024/00				N95	24	00
PC-07-004/R3S	TROLLEY REVERSE - SPEED 3	I:024/01				N95	24	01

LCU 102 File 43 Memory Map - LLW Exit Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
PC-07-004/R4S	TROLLEY REVERSE - SPEED 4	I:024/02				N95	24	02
PC-07-004/R5S	TROLLEY REVERSE - SPEED 5	I:024/03				N95	24	03
PC-07-004/U	HOIST RAISE COMMAND	I:024/05				N95	24	05
PC-07-004/D	HOIST LOWER COMMAND	I:023/12				N95	23	10
07-ZS-763A	HOIST RAISED	I:023/06				N95	23	06
07-ZS-763B	HOIST TROLLEY POSITION	I:023/07				N95	23	07
07-ZS-763C	HOIST TROLLEY POSITION	I:023/10				N95	23	8
07-ZS-763D	HOIST TROLLEY POSITION	I:023/11				N95	23	9
PC-07-004/P1	TROLLEY @ COMPACT RECEIPT POS. LED	O:045/15				N95	45	13
PC-07-004/P2	TROLLEY @ STORAGE POSITION 1 LED	O:045/16				N95	45	14
PC-07-004/P3	TROLLEY @ STORAGE POSITION 2 LED	O:045/17				N95	45	15
PC-07-004/P4	TROLLEY @ STORAGE POSITION 3 LED	O:046/00				N95	46	00
PC-07-004/P5	TROLLEY @ COMPACT LOAD OUT POS. LED	O:046/01				N95	46	01
PC-07-004/SF	TROLLEY MOTOR FORWARD & LOW SPEED	O:045/11				N95	45	9
PC-07-004/SR	TROLLEY MOTOR REVERSE & LOW SPEED	O:045/12				N95	45	10
PC-07-004/S2	TROLLEY MOTOR SPEED 2	O:045/04				N95	45	04
PC-07-004/S3	TROLLEY MOTOR SPEED 3	O:045/05				N95	45	05
PC-07-004/S4	TROLLEY MOTOR SPEED 4	O:045/06				N95	45	06
PC-07-004/S5	TROLLEY MOTOR SPEED 5	O:045/07				N95	45	07
PC-07-004/US	HOIST RAISED POSITION LED	O:046/02				N95	46	02
PC-07-004/ES	PENDANT ENABLED LED	O:045/14				N95	45	12
PC-07-004/SU	HOIST MOTOR RAISED	O:045/13				N95	45	11
PC-07-004/SD	HOIST MOTOR LOWERED	O:045/10				N95	45	8
DRUM LIFTER DH-07-104								
PC-07-004/CS	DRUM LIFTER CLOSE	O:046/06				N95	46	06
PC-07-004/OS	DRUM LIFTER OPEN	O:046/05				N95	46	05
07-ZSC-766	DRUM LIFTER CLOSED	I:024/07				N95	24	07
07-ZSO-766	DRUM LIFTER OPEN	I:024/10				N95	24	8
PC-07-004/C	DRUM LIFTER OPEN/CLOSE	O:050/14				N95	50	14
STAND ALONE INSTRUMENTS								
07-PDISL-353	LOW DIFFERENTIAL PRESSURE	I:025/04				N95	25	04
12-NT-310	BAR CODE SCANNER (PORTABLE)							
12-NT-312	BAR CODE SCANNER - COMPACT CONVEYOR		N43	110-122				
07-WT-761	COMPACT WEIGHT	I:006/03				N95	06	03
07-XS-313A	LIGHT CURTAIN	I:025/02				N95	25	02
07-XS-313B	LIGHT CURTAIN	I:025/03				N95	25	03
12-NT-316	BAR CODE SCANNER - COMPACT STORAGE		N43	135-147				
	STORAGE POSITION 1		N43	13	0			
	STORAGE POSITION 2		N43	13	1			
	STORAGE POSITION 3		N43	13	2			
07-FEV-301	PNEUMATIC VALVE MANIFOLD AIR SUPPLY	O:046/13				N95	46	13

LCU 102 File 43 Memory Map - LLW Exit Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
07-PDA-353	LOW DIFFERENTIAL PRESSURE WARNING BEACON	O:046/12				N95	46	12
BAR CODE								
	PLC TO PCS DISCONNECT BAR CODE LINK					N431	476	0
	PCS TO PLC BAR CODE (BCTS) HANDSHAKING BIT					N430	476	0
	PCS TO PLC BAR CODE (BCTS2) HANDSHAKING BIT					N430	476	1
	PCS TO PLC BAR CODE COMMAND REGISTER					N430	0-15	
	TEMPORARY INTERNAL DRUM PIN DATA TABLE							
	PLC TO PCS BAR CODE TERMINAL ID					N431	218	
	PLC TO PCS BAR CODE MESSAGE LENGTH					N431	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)					N431	220-229	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)					N431	230-239	
	BAR CODE IS A PIN		N43	12	11			
	TERMINAL #3 LOCATION = LLW PUCK RECEIPT POSITION		N43	8	0			
	TERMINAL #3 LOCATION = LLW EXIT STORAGE POSITION #1		N43	8	2			
	TERMINAL #3 LOCATION = LLW EXIT STORAGE POSITION #2		N43	8	4			
	TERMINAL #3 LOCATION = LLW EXIT STORAGE POSITION #3		N43	8	6			
	TERMINAL #5 LOCATION = LLW PUCK RECEIPT POSITION		N43	8	1			
	TERMINAL #5 LOCATION = LLW EXIT STORAGE POSITION #1		N43	8	3			
	TERMINAL #5 LOCATION = LLW EXIT STORAGE POSITION #2		N43	8	5			
	TERMINAL #5 LOCATION = LLW EXIT STORAGE POSITION #3		N43	8	7			
	TERMINAL #14 LOCATION = LLW EXIT STORAGE POSITION #1		N43	8	8			
	TERMINAL #14 LOCATION = LLW EXIT STORAGE POSITION #2		N43	8	9			
	TERMINAL #14 LOCATION = LLW EXIT STORAGE POSITION #3		N43	8	10			
PCS TO DMS								
	SEND MESSAGE TO NETCOM		N43	9	2			
5.3.1	CONTAINER LOCATION UPDATE		N43	5	6			
	DRUM LOCATION		N43	30				
	DRUM PIN		N43	31-38				
5.3.12	PUCK AND OVERPACK DRUM RELATIONSHIP		N43	4	13			
	LOCATION		N43	150				
	PUCK PIN		N43	151-158				
	OVERPACK PIN		N43	159-166				
COMPACT RECEIPT DRUM TRACKING TABLE								
	DRUM PIN		N43	50-57				
	WEIGHT			58				
	ROUTE			59-60				
	STATUS			61				
STORAGE POSITION DRUM TRACKING TABLE								
	DRUM PIN		N43	62-69				
	WEIGHT			70				
	ROUTE			71-72				

LCU 102 File 43 Memory Map - LLW Exit Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	STATUS			73				
STORAGE POSITION 2 DRUM TRACKING TABLE								
	DRUM PIN		N43	74-81				
	WEIGHT			82				
	ROUTE			83-84				
	STATUS			85				
LOADOUT POSITION TRACKING TABLE								
	DRUM PIN		N43	98-105				
	WEIGHT			106				
	ROUTE			107-108				
	STATUS			109				
DRUM LIFTER TRACKING TABLE								
	DRUM PIN		N43	123-130				
	WEIGHT			131				
	ROUTE			132-133				
	STATUS			134				
ALARMS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
	PORT FAILED TO CLOSE/LOCK	N434:07/03	N439	00	00-01	N434	07	03
	PORT FAILED TO OPEN	N434:07/02	N439	00	02-03	N434	07	02
	ABNORMAL POSITION - CLOSE/LOCK POSITION NOT VERIFIED	N434:07/04	N439	00	04-05	N434	07	04
	LOSS OF VACUUM	N434:07/00	N439	00	06-07	N434	07	00
	HOIST FAILED TO RAISE	N434:12/01	N439	00	08-09	N434	12	01
	TROLLEY FAILED TO REACH COMPACT RECEIPT	N434:12/00	N439	00	10-11	N434	12	00
	TROLLEY FAILED TO REACH STORAGE POSITION 1	N434:12/03	N439	00	12-13	N434	12	03
	TROLLEY FAILED TO REACH STORAGE POSITION 2	N434:12/04	N439	00	14-15	N434	12	04
	TROLLEY FAILED TO REACH STORAGE POSITION 3	N434:12/05	N439	01	00-01	N434	12	05
	TROLLEY FAILED TO REACH COMPACT LOAD OUT POSITION	N434:12/06	N439	01	02-03	N434	12	06
	LOW GLOVEBOX DIFFERENTIAL PRESSURE		N439	01	04-05			
	LLW PROCESS GLOVEBOX EMERGENCY STOP		N439	01	06-07			
END OF LCU 102 FILE 43 MEMORY MAP								

LCU 102 File 45 Memory Map - LLW RWM Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS								
LLW RWM BAGLESS TRANSFER DRUM ENTRY PORT DO-07-201								
07-ZS-920A	MANIPULATOR IN PARKED POSITION 1	I:031/04				N95	031	04
07-ZS-920B	MANIPULATOR IN PARKED POSITION 2	I:031/05				N95	031	05
07-ZS-920C	MANIPULATOR ARM PARKED	I:031/06				N95	031	06
07-ZS-920D	MANIPULATOR ARM PARKED	I:031/07				N95	031	07
DO-07-201/CS	LLW RWM G.B. BAGLESS TRANSFER PORT - DOOR CLOSED	I:016/04				N95	016	04
DO-07-201/OS	LLW RWM G.B. BAGLESS TRANSFER PORT - DOOR OPEN	I:016/05				N95	016	05
DO-07-201/C	LLW RWM G.B. BAGLESS TRANSFER PORT - OPEN/CLOSE	O:050/12				N95	050	10
LLW RWM DRUM ENTRY/EXIT PORT DO-07-202 (COMPLIANT LOADOUT)								
07-ZSC-908A	DRUM PORT CLOSED & LOCKED	I:030/12				N95	030	10
07-ZSC-908B	DRUM PORT CLOSED & LOCKED	I:030/06				N95	030	06
07-ZSC-909	DOOR DOWN	I:030/05				N95	030	05
07-ZSO-909	DRUM PORT ROTATED	I:030/13				N95	030	11
07-ZS-900A	DRUM DOOR CLOSED	I:030/04				N95	030	04
07-ZS-900B	DRUM DOOR IN POSITION	I:031/14				N95	031	12
07-ZS-900C	DRUM DOOR OPEN	I:031/15				N95	031	13
07-PS-900	SYSTEM ESTABLISHED ADEQUATE VACUUM	I:030/10				N95	030	8
07-ZS-907	DRUM LID IN POSITION	I:030/11				N95	030	9
07-ZSO-914	DRUM ENTRY/EXIT PORT CENTERING RETRACT	I:032/07				N95	032	07
07-PS-916	DRUM ENTRY/EXIT PORT SEAL LOST	I:032/10				N95	032	8
07-FEV-324A	DRUM CENTERING	O:047/15				N95		
07-FEV-910J/L*	DRUM ENTRY/EXIT PORT LOCK	O:102/03				N95	102	03
07-FEV-910J/UN*	DRUM ENTRY/EXIT PORT UNLOCK	O:102/02				N95	102	02
07-FEV-910K/O*	DRUM ENTRY/EXIT PORT OPEN	O:102/04				N95	102	04
07-FEV-910K/C*	DRUM ENTRY/EXIT PORT CLOSE	O:102/05				N95	102	05
07-FEV-910I/V*	DRUM ENTRY/EXIT PORT DRUM LID REMOVAL SYSTEM VACUUM	O:102/00				N95	102	00
07-FEV-910M/E*	DRUM ENTRY/EXIT PORT LID DETACH EXTEND	O:102/11				N95	102	9
07-FEV-910M/R*	DRUM ENTRY/EXIT PORT LID DETACH RETRACT	O:102/10				N95	102	8
07-FEV-910O/C*	DRUM ENTRY/EXIT DOOR CLOSE	O:102/14				N95	102	12
07-FEV-910O/O*	DRUM ENTRY/EXIT DOOR OPEN	O:102/15				N95	102	13
07-FEV-913D	ENTRY/EXIT PORT DOOR OPEN PRESSURE VENT	O:050/02				N95	050	02
07-FEV-913C	ENTRY/EXIT PORT DOOR CLOSE PRESSURE VENT	O:050/01				N95	050	01
07-FEV-910G*	DRUM ENTRY/EXIT PORT VACUUM ISOLATION	O:100/14				N95	100	14
07-FEV-325A	HVAC CONTROL SEAL OPEN/CLOSE	O:050/06				N95	050	06
LLW RWM DRUM ENTRY/EXIT PORT DO-07-203 (NON-COMPLIANT LOADOUT)								
07-ZSC-910A	DRUM PORT CLOSED & LOCKED	I:030/16						
07-ZSC-910B	DRUM PORT CLOSED & LOCKED	I:030/07				N95	030	14
07-ZSC-911	DOOR DOWN	I:031/03				N95	030	07
07-ZSO-911	DRUM PORT ROTATED	I:030/17				N95	031	03
07-ZS-912A	DRUM DOOR CLOSED	I:031/00				N95	030	15

LCU 102 File 45 Memory Map - LLW RWM Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
07-ZS-912B	DRUM DOOR IN POSITION	I:031/01				N95	031	00
07-ZS-912C	DRUM DOOR OPEN	I:031/02				N95	031	01
07-PS-901	SYSTEM ESTABLISHED ADEQUATE VACUUM	I:030/14				N95	031	02
07-ZS-913	DRUM LID IN POSITION	I:030/15				N95	030	12
07-ZSO-915	DRUM ENTRY/EXIT PORT CENTERING RETRACT	I:032/11				N95	030	13
07-PS-917	DRUM ENTRY/EXIT PORT SEAL LOST	I:032/12				N95	032	9
07-FEV-324B	DRUM CENTERING	O:050/00				N95	032	10
07-FEV-910E/L*	DRUM ENTRY/EXIT PORT LOCK	O:100/11				N95	050	00
07-FEV-910E/UN*	DRUM ENTRY/EXIT PORT UNLOCK	O:100/10				N95	100	11
07-FEV-910H/O*	DRUM ENTRY/EXIT PORT OPEN	O:100/16				N95	100	10
07-FEV-910H/C*	DRUM ENTRY/EXIT PORT CLOSE	O:100/17				N95	100	16
07-FEV-910D/V*	DRUM ENTRY/EXIT PORT DRUM LID REMOVAL SYSTEM VACUUM	O:100/06				N95	100	17
07-FEV-910L/E*	DRUM ENTRY/EXIT PORT LID DETACH EXTEND	O:102/07				N95	100	8
07-FEV-910L/R*	DRUM ENTRY/EXIT PORT LID DETACH RETRACT	O:102/06				N95	102	07
07-FEV-910N/C*	DRUM ENTRY/EXIT DOOR CLOSE	O:102/12				N95	102	06
07-FEV-910N/O*	DRUM ENTRY/EXIT DOOR OPEN	O:102/13				N95	102	10
07-FEV-913B	ENTRY/EXIT PORT DOOR CLOSE PRESSURE VENT	O:047/17				N95	102	11
07-FEV-913A	ENTRY/EXIT PORT DOOR OPEN PRESSURE VENT	O:047/16				N95	047	17
07-FEV-910F*	DRUM ENTRY/EXIT PORT VACUUM ISOLATION	O:100/12				N95	047	14
07-FEV-325B	HVAC CONTROL SEAL OPEN/CLOSE	O:050/07				N95	100	12
BAR CODE						N95	050	07
	PLC TO PCS DISCONNECT BAR CODE LINK TERMINAL #3							
	PLC TO PCS DISCONNECT BAR CODE LINK TERMINAL #5							
	PCS TO PLC BAR CODE (BCTS) HANDSHAKING BIT					N451	476	0
	PCS TO PLC BAR CODE (BCTS2) HANDSHAKING BIT					N451	476	1
	PCS TO PLC BAR CODE COMMAND REGISTER					N450	476	0
	TEMPORARY INTERNAL DRUM PIN DATA TABLE					N450	476	1
	PLC TO PCS BAR CODE TERMINAL ID					N450	0-15	
	PLC TO PCS BAR CODE MESSAGE LENGTH							
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)					N451	218	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)					N451	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)					N451	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)					N451	236-251	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)					N451	252-267	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)					N451	268-283	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)					N451	284-299	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)					N451	300-315	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)					N451	316-331	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)					N451	332-347	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)					N451	348-363	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)					N451	364-379	

LCU 102 File 45 Memory Map - LLW RWM Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)					N451	380-395	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)					N451	396-411	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)					N451	412-427	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)					N451	428-443	
	BAR CODE IS A PIN		N45	9	6	N451	444-459	
	BAR CODE IS A NON-COMPLIANT ITEM / PACKET PIN		N45	9	1	N451	460-475	
	BAR CODE IS A SAMPLE PIN		N45	9	2			
	BAR CODE IS A PURGE PORT PIN		N45	9	0			
	BAR CODE IS A TRANSFER PIG PIN		N45	9	3			
	BAR CODE IS A COLLECTION CONTAINER PIN		N45	9	4			
	BAR CODE IS A TREATMENT CONTAINER PIN		N45	9	5			
	TERMINAL #3 LOCATION = LLW_RWM PURGE PORT		N45	8	0			
	TERMINAL #3 LOCATION = LLW_RWM SAMPLE LOCATION		N45	8	2			
	TERMINAL #3 LOCATION = LLW_RWM TREATMENT LOCATION		N45	8	4			
	TERMINAL #5 LOCATION = LLW_RWM PURGE PORT		N45	8	1			
	TERMINAL #5 LOCATION = LLW_RWM SAMPLE LOCATION		N45	8	3			
	TERMINAL #5 LOCATION = LLW_RWM TREATMENT LOCATION		N45	8	5			
PCS TO DMS								
	SEND MESSAGE TO NETCOM		N45	6	1			
5.3.7	PURGE PORT LOCATION UPDATE		N45	6	4			
5.3.8	SAMPLE AND PARENT DRUM / PACKET RELATIONSHIP		N45	6	5			
5.3.9	SAMPLE AND PURGE PORT RELATIONSHIP		N45	6	6			
5.3.10	PURGE PORT AND TRANSFER PIG RELATIONSHIP		N45	6	7			
5.3.13	REMOVE ITEMS FROM TRANSFER STAND		N45	6	8			
5.3.14	ADD ITEMS TO TRANSFER STAND		N45	6	9			
5.3.15	NON-COMPLIANT ITEM TO PACKET RELATIONSHIP		N45	6	10			
5.3.16	AEROSOL CAN TO COLLECTION CONTAINER RELATIONSHIP		N45	6	11			
5.3.17	NON-COMPLIANT ITEMS PRESENTED FOR TREATMENT		N45	6	12			
5.3.18	SAMPLES PRESENTED FOR TREATMENT		N45	6	13			
5.3.19	TREATMENT CONTAINER AND ITEM CONTAINER RELATIONSHIP		N45	6	14			
	ITEM PIN		N45	76-83				
5.3.20	TREATMENT CONTAINER AND LOADOUT DRUM RELATIONSHIP		N45	6	15			
	ITEM PIN		N45	84-91				
ALARMS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")								
	ENTRY/EXIT PORT 2 FAILED TO CLOSE/LOCK	N454:07/02	N459	00	00-01	N454	07	02
	ENTRY/EXIT PORT 2 FAILED TO OPEN	N454:07/01	N459	00	02-03	N454	07	01
	ENTRY/EXIT PORT 2 ABNORMAL POSITION - CLOSE/LOCK POS. NOT VERIFIED	N454:07/03	N459	00	04-05	N454	07	03
	ENTRY/EXIT PORT 2 LOSS OF VACUUM	N454:07/00	N459	00	06-07	N454	07	00
	ENTRY/EXIT PORT 3 FAILED TO CLOSE/LOCK	N454:10/02	N459	00	08-09	N454	10	02
	ENTRY/EXIT PORT 3 FAILED TO OPEN	N454:10/01	N459	00	10-11	N454	10	01

LCU 102 File 45 Memory Map - LLW RWM Glovebox

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	ENTRY/EXIT PORT 3 ABNORMAL POSITION - CLOSE/LOCK POS. NOT VERIFIED+C33	N454:10/03	N459	00	12-13	N454	10	03
	ENTRY/EXIT PORT 3 LOSS OF VACUUM	N454:10/00	N459	00	14-15	N454	10	00
	LOW GLOVEBOX DIFFERENTIAL PRESSURE		N459	01	00-01			
END OF LCU 102 FILE 45 MEMORY MAP								

LCU 102 File 46 Memory Map - LLW Supervisory Control

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS								
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.		N46	0				
5.5.1	REQUEST STATUS OF AGV SYSTEM							
5.5.2	REQUEST LOCATION OF AN AGV							
	AGV TO GET LOCATION OF		N46	4				
5.5.5	REQUEST TRANSPORT QUEUE OF AGV SYSTEM							
	AGV TO GET QUEUE OF		N46	20				
5.5.6	DISABLE ALL AGV MOVEMENT							
	AGV TO DISABLE		N46	22				
5.5.7	ENABLE ALL AGV MOVEMENT							
	AGV TO ENABLE		N46	24				
5.5.8	STATUS OF PCS SYSTEM							
	EQUIP. STATUS VALUE		N46	26-27				
	SOFTWARE ERROR CODE		N46	28				
	EQUIP. STATUE MESSAGE		N46	29-60				
5.5.10	ADVANCE AGV AT GLOVEBOX HOLD_POINT LOCATION							
	AGV TO ADVANCE							
AGV TO PLC								
	PCS TO PLC MESSAGE DESTINATION = RECEIVING		B3		13			
5.6.1	STATUS OF AGV SYSTEM							
	STATUS VALUE		N46	61-62				
	SOFTWARE ERROR CODE		N46	63				
	STATUE MESSAGE		N46	64-95				
5.6.2	PROCESS AGV							
	PU LOCATION		N46	97				
	DO LOCATION		N46	98				
	ROLLER DECK USING		N46	99				
	WHICH LOCATION IS AGV AT		N46	100				
	# OF DRUMS ON AGV		N46	101				
	ROLLER DECK #1 DRUM PIN		N46	102-109				
	ROLLER DECK #2 DRUM PIN		N46	110-117				
5.6.2	NDE AGV							
	PU LOCATION		N46	250				
	DO LOCATION		N46	251				
	ROLLER DECK USING		N46	252				
	WHICH LOCATION IS AGV AT		N46	253				
	# OF DRUMS ON AGV		N46	254				
	ROLLER DECK #1 DRUM PIN		N46	255-262				
	ROLLER DECK #2 DRUM PIN		N46	263-270				
5.6.3	REQUEST TO OPEN S/R/NDE/NDA DOOR							
5.6.4	OK TO CLOSE S/R/NDE/NDA DOOR							
5.6.5	TRANSPORT REQUEST RECEIVED CONFIRMATION							

LCU 102 File 46 Memory Map - LLW Supervisory Control

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	AGV TRANSPORTING		N46	118				
	ROLLER DECK DRUM IS ON		N46	119				
	LENGTH OF QUEUE		N46	120				
5.6.6	TRANSPORT QUEUE LIST IN AGV							
	AGV REPORTING QUEUE		N46	121				
	QUEUE LENGTH		N46	122				
5.6.7	AGV TRANSPORT COMMAND							
	AGV COMMAND FROM		N46	123				
	DRUM PIN		N46	124-131				
	PICKUP LOCATION		N46	132				
	PICKUP REQUEST OR COMMAND		N46	133				
	DROPOFF LOCATION		N46	134				
	DROPOFF REQUEST OR COMMAND		N46	135				
PROCESS AGV DRUM TRACKING TABLE								
	ROLLER DECK #1 - PIN		N468	0-7				
	ROLLER DECK #1 - WEIGHT		N468	8				
	ROLLER DECK #1 - ROUTE		N468	9-10				
	ROLLER DECK #1 - SAMPLE/COMPLIANT		N468	11				
	ROLLER DECK #2 - PIN		N468	20-27				
	ROLLER DECK #2 - WEIGHT		N468	28				
	ROLLER DECK #2 - ROUTE		N468	29-30				
	ROLLER DECK #2 - SAMPLE/COMPLIANT		N468	31				
NDA/NDE AGV DRUM TRACKING TABLE								
	ROLLER DECK #1 - PIN		N468	40-47				
	ROLLER DECK #1 - WEIGHT		N468	48				
	ROLLER DECK #1 - ROUTE		N468	49-50				
	ROLLER DECK #1 - SAMPLE/COMPLIANT		N468	51				
	ROLLER DECK #2 - PIN		N468	60-67				
	ROLLER DECK #2 - WEIGHT		N468	68				
	ROLLER DECK #2 - ROUTE		N468	69-70				
	ROLLER DECK #2 - SAMPLE/COMPLIANT		N468	71				
PLC TO PCS								
	MODULE-TO-SUPV. TRANSMIT (T1) HANDSHAKING BIT		N46	0	0			
	MODULE-TO-SUPV. RECEIVE (T2) HANDSHAKING BIT		N46	0	1			
	MESSAGE SENT TO SUPV.		B3		3			
	PLC-TO-PCS CLEAR TO SEND (CTS) HANDSHAKING BIT					N461	20	0
	PLC-TO-PCS MESSAGE BUFFER					N475		
	TRANSMIT MESSAGE INDEX # REGISTER					N475	0	
	PCS-TO-PLC MESSAGE LOST					N461	21	0
	PCS-TO-PLC MESSAGE ERROR					N461	21	1
5.3.22	REQUEST STATUS OF DMS SYSTEM		N46	140				
5.3.25	STATUS OF PCS SYSTEM							

LCU 102 File 46 Memory Map - LLW Supervisory Control

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	EQUIPMENT STATUS VALUE		N70	0-1				
	SOFTWARE ERROR CODE		N70	2				
	STATUS MESSAGE		N70	3-34				
PCS TO PLC								
	PCS-TO-PLC RECEIVE (SR1) HANDSHAKING BIT					N460	20	0
	PCS-TO-PLC MESSAGE SENT (SR2) HANDSHAKING BIT					N460	20	1
	PCS-TO-PLC MESSAGE BUFFER					N476		
	PCS-TO-PLC MESSAGE ERROR					N460	21	0
	RECEIVE MESSAGE INDEX # REGISTER		N46	150				
	PCS MESSAGE RECEIVED BY MODULE		B3		2			
5.4.2	FISSILE INVENTORY LEVEL							
	AREA LOCATION		N46	160				
	CURRENT LEVEL (GRAMS)		N46	161-162				
	ALARM EXISTING		N46	163				
	FISSILE MATERIAL INVENTORY ALARM		N46	3	0			
	FISSILE MATERIAL INVENTORY ALARM ACKNOWLEDGE					N461	21	1
5.4.12	STATUS OF DMS SYSTEM							
	EQUIPMENT STATUS VALUE		N46	175-176				
	SOFTWARE ERROR CODE		N46	177				
	STATUS MESSAGE		N46	178-209				
5.4.14	CRITICALITY ALERT							
	CONTAINER IDENTIFICATION		N46	210-217				
	ALARM LEVEL		N46	218-219				
	CRITICALITY LOCATION		N46	220				
	CRITICALITY ALERT		N46	3	1			
	CRITICALITY ALERT ACKNOWLEDGE					N461	21	2
5.4.15	REQUEST STATUS OF PCS SYSTEM							
5.4.17	FACILITY CURIE LEVEL							
	DOSAGE EQUIVALENT (CURIES)		N46	221-222				
	ALARM EXISTING		N46	223				
	CURIE ALARM		N46	3	2			
	CURIE ALARM ACKNOWLEDGE					N461	21	3
MISCELLANEOUS								
	"LAST BAR CODE:" MESSAGE		N90	300-306				
	"BAR CODE HIST:" MESSAGE		N90	308-315				
	"OPERATION:" MESSAGE		N90	317-321				
	"LOCATION UPDATE" OPERATION		N90	100-107				
	"LOCATION: " MESSAGE		N90	323-326				
	"BOXNDA" LOCATION		N90	9-11				
	"COMMAND NOT RECOGNIZED" MESSAGE		N90	328-338				
	"READY FOR NEXT DRUM PIN" MESSAGE		N90	340-351				
	"DRUM PIN ACCEPTED" MESSAGE		N90	416-424				

LCU 102 File 46 Memory Map - LLW Supervisory Control

Tag Name	Description	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
			Data File	Word	Bit	Data File	Word	Bit
	"INVALID DATA" MESSAGE		N90	353-358				
	"PROCEDURE DONE, DATA SENT" MESSAGE		N90	360-372				
	"DRUMS ACCEPTED" MESSAGE		N90	374-380				
	"FACILITY CURIE LEVEL EXCEEDED" MESSAGE		N90	382-396				
	"DMS NOT RESPONDING" MESSAGE		N90	398-406				
END OF LCU 102 FILE 46 MEMORY MAP								

Appendix D
Local Control Unit 103
Memory Maps

Appendix D
Local Control Unit 103
Memory Maps

Table of Contents

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS									
TRU RWM DRUM LIFT TABLE 201A (NON-COMPLIANT LOADOUT)									
09-HS-221A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:11/11				N95	11	11
09-HS-221B/U	RAISE LIFT TABLE PUSHBUTTON	DI	I:11/15				N95	11	15
09-HS-221B/D	LOWER LIFT TABLE PUSHBUTTON	DI	I:11/14				N95	11	14
09-HS-221C/F	ROLLER CONVEYOR FORWARD PUSHBUTTON	DI	I:11/07				N95	11	07
09-HS-221C/R	ROLLER CONVEYOR REVERSE PUSHBUTTON	DI	I:11/10				N95	11	10
09-HS-221D	LOCAL PUSHBUTTONS ENABLED SWITCH	DI	I:11/16				N95	11	16
09-ZS-221A	AGV HANDSHAKE SIGNAL S1	DI	I:11/02				N95	11	02
09-ZS-221C	LIFT TABLE DOWN OVERTRAVEL	DI	I:11/06				N95	11	06
09-ZS-221D	LIFT TABLE UP OVERTRAVEL	DI	I:11/05				N95	11	05
09-ZS-221E	DRUM AT END OF CONVEYOR	DI	I:11/04				N95	11	04
09-ZS-221F	DRUM UNDER GLOVEBOX PORT	DI	I:11/13				N95	11	13
09-ZS-221G	AGV MATING HEIGHT	DI	I:11/12				N95	11	12
09-XS-221A/B	ROPE SWITCH A/B	DI	I:11/17				N95	11	17
09-ZY-221A	AGV HANDSHAKE SIGNAL S1	DO	O:40/15				N95	40	15
107-LT-09-201A/F	ROLLER CONVEYOR FORWARD	DO	O:40/13				N95	40	13
107-LT-09-201A/R	ROLLER CONVEYOR REVERSE	DO	O:40/14				N95	40	14
09-ZL-221D	DRUM IN POSITION	DO	O:40/16				N95	40	16
LT09201A_SP	LIFT TABLE STOP COMMAND	DO	O:50/02				N95	50	02
WEIGHT TRANSMITTER REGISTERS									
09-WIT-221	INTEGER VALUE			N32	174				
RTAP CONTROL POINTS									
	INTEGER VALUE WEIGHT SETPOINT			N32	200				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER									
LT-09-201A/D	LOWER AT NORMAL SPEED	B					N324	00	04
LT-09-201A/SP	STOP	B					N324	00	06
LT-09-201A/BTP	RAISE TO BAGLESS TRANSFER PORT	B					N324	00	07
	PLC STATUS REGISTER			N324	11				
	PLC INDEX REGISTER			N324	12				
	PLC COMMAND REGISTER			N324	13				

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
09-HS-223A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:12/03				N95	12	03
09-HS-223B/U	RAISE LIFT TABLE PUSHBUTTON	DI	I:12/11				N95	12	11
09-HS-223B/D	LOWER LIFT TABLE PUSHBUTTON	DI	I:12/12				N95	12	12
09-HS-223C/F	ROLLER CONVEYOR FORWARD PUSHBUTTON	DI	I:12/07				N95	12	07
09-HS-223C/R	ROLLER CONVEYOR REVERSE PUSHBUTTON	DI	I:12/06				N95	12	06
09-HS-223D	LOCAL PUSHBUTTONS ENABLED SWITCH	DI	I:12/02				N95	12	02
09-ZS-223A	AGV HANDSHAKE SIGNAL S1	DI	I:12/00				N95	12	00
09-ZS-223C	LIFT TABLE DOWN OVERTRAVEL	DI	I:12/14				N95	12	14
09-ZS-223D	LIFT TABLE UP OVERTRAVEL	DI	I:12/04				N95	12	04
09-ZS-223E	DRUM AT END OF CONVEYOR	DI	I:12/05				N95	12	05
09-ZS-223F	DRUM UNDER GLOVEBOX PORT	DI	I:12/13				N95	12	13
09-ZS-223G	AGV MATING HEIGHT	DI	I:12/10				N95	12	10
09-XS-223A/B	ROPE SWITCH A/B	DI	I:12/15				N95	12	15
09-ZY-223A	AGV HANDSHAKE SIGNAL S1	DO	O:41/02				N95	41	02
107-LT-09-201B/F	ROLLER CONVEYOR FORWARD	DO	O:41/04				N95	41	04
107-LT-09-201B/R	ROLLER CONVEYOR REVERSE	DO	O:41/01				N95	41	01
09-ZL-223D	DRUM IN POSITION	DO	O:41/03				N95	41	03
LT09201B_SP	LIFT TABLE STOP COMMAND	DO	O:50/03				N95	50	03
WEIGHT TRANSMITTER REGISTERS									
09-WIT-223	INTEGER VALUE			N32	178				
RTAP CONTROL POINTS									
	INTEGER VALUE SETPOINT			N32	202				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER									
LT-09-201B/D	LOWER AT NORMAL SPEED	B					N324	01	04
LT-09-201B/SP	STOP	B					N324	01	06
LT-09-201B/BTP	RAISE TO BAGLESS TRANSFER PORT	B					N324	01	07
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS									
PLC TO SERCOM COMMUNICATION REGISTERS									
	SERCOM STATUS REGISTER			N324	14				
	SERCOM INDEX REGISTER			N324	15				
	SERCOM RESPONSER REGISTER			N324	16				

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	PLC STATUS REGISTER			N324	17				
	PLC INDEX REGISTER			N324	18				
	PLC COMMAND REGISTER			N324	19				
TRU RWM DRUM LIFT TABLE 201C (BAGLESS TRANSFER PORT)									
09-HS-225A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:13/02				N95	13	02
09-HS-225B/U	RAISE LIFT TABLE PUSHBUTTON	DI	I:!2/16				N95	!2	16
09-HS-225B/D	LOWER LIFT TABLE PUSHBUTTON	DI	I:!2/17				N95	!2	17
09-HS-225C/F	ROLLER CONVEYOR FORWARD PUSHBUTTON	DI	I:13/04				N95	13	04
09-HS-225C/R	ROLLER CONVEYOR REVERSE PUSHBUTTON	DI	I:13/03				N95	13	03
09-HS-225D	LOCAL PUSHBUTTONS ENABLED SWITCH	DI	I:13/13				N95	13	13
09-ZS-225A	AGV HANDSHAKE SIGNAL S1	DI	I:13/10				N95	13	10
09-ZS-225C	LIFT TABLE DOWN OVERTRAVEL	DI	I:13/05				N95	13	05
09-ZS-225D	LIFT TABLE UP OVERTRAVEL	DI	I:13/06				N95	13	06
09-ZS-225E	DRUM AT END OF CONVEYOR	DI	I:13/07				N95	13	07
09-ZS-225F	DRUM UNDER GLOVEBOX PORT	DI	I:13/01				N95	13	01
09-ZS-225G	AGV MATING HEIGHT	DI	I:13/00				N95	13	00
09-XS-225A/B	ROPE SWITCH A/B	DI	I:13/12				N95	13	12
09-ZY-225A	AGV HANDSHAKE SIGNAL S1	DO	O:41/10				N95	41	10
107-LT-09-201C/F	ROLLER CONVEYOR FORWARD	DO	O:41/06				N95	41	06
107-LT-09-201C/R	ROLLER CONVEYOR REVERSE	DO	O:41/07				N95	41	07
09-ZL-225D	DRUM IN POSITION	DO	O:41/11				N95	41	11
LT09201C_SP	LIFT TABLE STOP COMMAND	DO	O:50/04				N95	50	04
WEIGHT TRANSMITTER REGISTERS									
09-WIT-225	INTEGER VALUE			N32	182				
RTAP CONTROL POINTS									
	INTEGER VALUE SETPOINT			N32	204				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER									
LT-09-201C/D	LOWER AT NORMAL SPEED	B					N324	5	4
LT-09-201C/SP	STOP	B					N324	5	6
LT-09-201C/BTP	RAISE TO BAGLESS TRANSFER PORT	B					N324	5	7
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS									

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
PLC TO SERCOM COMMUNICATION REGISTERS									
	SERCOM STATUS REGISTER			N324	20				
	SERCOM INDEX REGISTER			N324	21				
	SERCOM RESPONSE REGISTER			N324	22				
	PLC STATUS REGISTER			N324	23				
	PLC INDEX REGISTER			N324	24				
	PLC COMMAND REGISTER			N324	25				
TRU RWM DRUM LIFT TABLE 202B (ENTRY PORT)									
END OF LCU 103 FI	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:41/04				N95	41	04
09-ZS-235A	AGV HANDSHAKE SIGNAL S1	DI	I:14/02				N95	14	02
09-ZS-235C	LIFT TABLE DOWN OVERTRAVEL	DI	I:13/14				N95	13	14
09-ZS-235D	LIFT TABLE UP OVERTRAVEL	DI	I:14/01				N95	14	01
09-ZS-235E	DRUM AT END OF CONVEYOR	DI	I:14/00				N95	14	00
09-ZS-235F	DRUM UNDER GLOVEBOX PORT	DI	I:13/15				N95	13	15
09-ZS-235G	AGV MATING HEIGHT	DI	I:13/16				N95	13	16
09-XS-235A/B	ROPE SWITCH A/B	DI	I:14/03				N95	14	03
09-ZY-235A	AGV HANDSHAKE SIGNAL S1	DO	O:41/15				N95	41	15
107-LT-09-202B/F	ROLLER CONVEYOR FORWARD	DO	O:41/14				N95	41	14
107-LT-09-202B/R	ROLLER CONVEYOR REVERSE	DO	O:41/17				N95	41	17
09-ZL-235D	DRUM IN POSITION	DO	O:41/16				N95	41	16
LT09202B_SP	LIFT TABLE STOP COMMAND	DO	O:50/05				N95	50	05
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER									
LT-09-202B/P1	GO TO "DRUM CENTERING POSITION" AT NORMAL SPEED	B					N324	02	00
LT-09-202B/P2	GO TO "LID IN POSITION" AT SLOW SPEED	B					N324	02	01
LT-09-202B/P3	GO TO "DOOR IN POSITION" AT SLOW SPEED	B					N324	02	02
LT-09-202B/P4	LOWER TO "DRUM CENTERING POSITION" AT SLOW SPEED	B					N324	02	03
LT-09-202B/D	LOWER AT NORMAL SPEED	B					N324	02	04
LT-09-202B/SP	STOP	B					N324	02	06
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS									
LT-09-202B/P1S	AT "DRUM CENTERING POSITION"	B					N325	02	00
LT-09-202B/P2S	AT "LID IN POSITION" POINT	B					N325	02	01

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
LT-09-202B/P3S	AT "DOOR IN POSITION" POINT	B					N325	02	02
PLC TO SERCOM COMMUNICATION REGISTERS									
	SERCOM STATUS REGISTER			N324	26				
	SERCOM INDEX REGISTER			N324	27				
	SERCOM RESPONSE REGISTER			N324	28				
	PLC STATUS REGISTER			N324	29				
	PLC INDEX REGISTER			N324	30				
	PLC COMMAND REGISTER			N324	31				
TRU RWM DRUM LIFT TABLE 202D (EXIT PORT)									
09-HS-239A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:14/12				N95	14	12
09-ZS-239A	AGV HANDSHAKE SIGNAL S1	DI	I:14/05				N95	14	05
09-ZS-239C	LIFT TABLE DOWN OVERTRAVEL	DI	I:14/07				N95	14	07
09-ZS-239D	LIFT TABLE UP OVERTRAVEL	DI	I:14/11				N95	14	11
09-ZS-239E	DRUM AT END OF CONVEYOR	DI	I:14/06				N95	14	06
09-ZS-239F	DRUM UNDER GLOVEBOX PORT	DI	I:14/10				N95	14	10
09-ZS-239G	AGV MATING HEIGHT	DI	I:14/13				N95	14	13
09-XS-239A/B	ROPE SWITCH A/B	DI	I:14/15				N95	14	15
09-ZY-239A	AGV HANDSHAKE SIGNAL S1	DO	O:42/03				N95	42	03
107-LT-09-202D/F	ROLLER CONVEYOR FORWARD	DO	O:42/02				N95	42	02
107-LT-09-202D/R	ROLLER CONVEYOR REVERSE	DO	O:42/07				N95	42	07
107-LT-09-202D/U	RAISE LIFT TABLE	DO	O:42/05				N95	42	05
107-LT-09-202D/D	LOWER LIFT TABLE	DO	O:42/06				N95	42	06
09-ZL-239D	DRUM IN POSITION	DO	O:42/04				N95	42	04
LT09202D_SP	LIFT TABLE STOP COMMAND	DO	O:50/06				N95	50	06
WEIGHT TRANSMITTER REGISTER									
09-WIT-239	INTEGER VALUE			N32	186				
RTAP CONTROL POINTS									
	INTEGER VALUE SETPOINT			N32	206				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER									
LT-09-202D/U	RAISE AT NORMAL SPEED	B					N324	03	05
LT-09-202D/SP	STOP	B					N324	03	06

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
LT-09-202D/BTP	GO TO BAGLESS TRANSFER PORT	B					N324	03	07
LT-09-202D/LP	GO TO LOWERED POSITION	B					N324	03	11
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS									
LT-09-201C/LPS	AT LOWERED POSITION	B					N325	03	13
PLC TO SERCOM COMMUNICATION REGISTERS									
	SERCOM STATUS REGISTER			N324	32				
	SERCOM INDEX REGISTER			N324	33				
	SERCOM RESPONSE REGISTER			N324	34				
	PLC STATUS REGISTER			N324	35				
	PLC INDEX REGISTER			N324	36				
	PLC COMMAND REGISTER			N324	37				
TRU RWM DRUM LIFT TABLE 202E (EXIT PORT)									
09-HS-247A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:15/06				N95	15	06
09-ZS-247A	AGV HANDSHAKE SIGNAL S1	DI	I:14/16				N95	14	16
09-ZS-247C	LIFT TABLE DOWN OVERTRAVEL	DI	I:15/00				N95	15	00
09-ZS-247D	LIFT TABLE UP OVERTRAVEL	DI	I:15/01				N95	15	01
09-ZS-247E	DRUM AT END OF CONVEYOR	DI	I:!5/02				N95	!5	02
09-ZS-247F	DRUM UNDER GLOVEBOX PORT	DI	I:15/03				N95	15	03
09-ZS-247G	AGV MATING HEIGHT	DI	I:15/04				N95	15	04
09-XS-247A/B	ROPE SWITCH A/B	DI	I:15/05				N95	15	05
09-ZY-247A	AGV HANDSHAKE SIGNAL S1	DO	O:42/10				N95	42	10
107-LT-09-202E/F	ROLLER CONVEYOR FORWARD	DO	O:42/12				N95	42	12
107-LT-09-202E/R	ROLLER CONVEYOR REVERSE	DO	O:42/13				N95	42	13
07-ZL-247D	DRUM IN POSITION	DO	O:42/11				N95	42	11
LT09202E_SP	LIFT TABLE STOP COMMAND	DO	O:50/07				N95	50	07
WEIGHT TRANSMITTER REGISTERS									
09-WIT-247	INTEGER VALUE			N32	198				
RTAP CONTROL POINTS									
	INTEGER VALUE SETPOINT			N32	212				
LT-09-202D/U	RAISE AT NORMAL SPEED	B					N324	03	05
LT-09-202D/SP	STOP	B					N324	03	06

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
LT-09-202E/SP	STOP	B					N324	04	06
LT-09-202E/BTP	GO TO BAGLESS TRANSFER PORT	B					N324	04	07
LT-09-202E/LP	GO TO LOWERED POSITION	B					N324	04	11
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS									
LT-09-201C/LPS	AT LOWERED POSITION	B					N325	04	13
PLC TO SERCOM COMMUNICATION REGISTERS									
	SERCOM STATUS REGISTER			N324	38				
	SERCOM INDEX REGISTER			N324	39				
	SERCOM RESPONSE REGISTER			N324	40				
	PLC STATUS REGISTER			N324	41				
	PLC INDEX REGISTER			N324	42				
	PLC COMMAND REGISTER			N324	43				
TRU RWM DRUM LIFT TABLE 203B (RWM TRANSFER PORT)									
09-HS-243A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:15/12				N95	15	12
09-ZS-243A	AGV HANDSHAKE SIGNAL S1	DI	I:15/15				N95	15	15
09-ZS-243C	LIFT TABLE DOWN OVERTRAVEL	DI	I:15/11				N95	15	11
09-ZS-243D	LIFT TABLE UP OVERTRAVEL	DI	I:15/10				N95	15	10
09-ZS-243E	DRUM AT END OF CONVEYOR	DI	I:15/07				N95	15	07
09-ZS-243F	DRUM UNDER GLOVEBOX PORT	DI	I:15/13				N95	15	13
09-ZS-243G	AGV MATING HEIGHT	DI	I:15/14				N95	15	14
09-XS-243A/B	ROPE SWITCH A/B	DI	I:15/17				N95	15	17
09-ZY-243A	AGV HANDSHAKE SIGNAL S1	DO	O:42/16				N95	42	16
107-LT-09-203B/F	ROLLER CONVEYOR FORWARD	DO	O:43/03				N95	43	03
107-LT-09-203B/R	ROLLER CONVEYOR REVERSE	DO	O:43/00				N95	43	00
09-ZL-243D	DRUM IN POSITION	DO	O:42/17				N95	42	17
LT09203B_SP	LIFT TABLE STOP COMMAND	DO	O:50/10				N95	50	10
WEIGHT TRANSMITTER REGISTERS									
09-WIT-243	INTEGER VALUE			N32	190				
RTAP CONTROL POINTS									
	INTEGER VALUE SETPOINT			N32	208				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER									

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
LT-09-203B/D	LOWER AT NORMAL SPEED	B					N324	6	4
LT-09-203B/SP	STOP	B					N324	6	6
LT-09-203B/BTP	GO TO BAGLESS TRANSFER PORT	B					N324	6	7
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS									
PLC TO SERCOM COMMUNICATION REGISTERS									
	SERCOM STATUS REGISTER			N324	44				
	SERCOM INDEX REGISTER			N324	45				
	SERCOM RESPONSE REGISTER			N324	46				
	PLC STATUS REGISTER			N324	47				
	PLC INDEX REGISTER			N324	48				
	PLC COMMAND REGISTER			N324	49				
TRU RWM DRUM LIFT TABLE 203C (EMPTY DRUM LOADOUT)									
09-HS-245A	MAINTENANCE-OFF-NORMAL (M-O-N) SWITCH IN NORMAL POS.	DI	I:16/10				N95	16	10
09-ZS-245A	AGV HANDSHAKE SIGNAL S1	DI	I:16/00				N95	16	00
09-ZS-245C	LIFT TABLE DOWN OVERTRAVEL	DI	I:16/02				N95	16	02
09-ZS-245D	LIFT TABLE UP OVERTRAVEL	DI	I:16/03				N95	16	03
09-ZS-245E	DRUM AT END OF CONVEYOR	DI	I:16/04				N95	16	04
09-ZS-245F	DRUM UNDER GLOVEBOX PORT	DI	I:16/05				N95	16	05
09-ZS-245G	AGV MATING HEIGHT	DI	I:16/06				N95	16	06
09-XS-245A/B	ROPE SWITCH A/B	DI	I:16/07				N95	16	07
09-ZY-245A	AGV HANDSHAKE SIGNAL S1	DO	O:43/04				N95	43	04
107-LT-09-203C/F	ROLLER CONVEYOR FORWARD	DO	O:43/06				N95	43	06
107-LT-09-203C/R	ROLLER CONVEYOR REVERSE	DO	O:43/07				N95	43	07
09-ZL-245D	DRUM IN POSITION	DO	O:43/05				N95	43	05
LT09203C_SP	LIFT TABLE STOP COMMAND	DO	O:50/01				N95	50	01
WEIGHT TRANSMITTER REGISTERS									
09-WIT-245	INTEGER VALUE			N32	194				
RTAP CONTROL POINTS									
	INTEGER VALUE SETPOINT			N32	210				
PCS TO LIFT TABLE SERVO MOTOR CONTROLLER									
LT-09-203C/D	LOWER AT NORMAL SPEED	B					N324	7	4

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
LT-09-203C/SP	STOP	B					N324	7	6
LT-09-203C/LP	GO TO BAGLESS TRANSFER PORT	B					N324	7	11
LIFT TABLE SERVO MOTOR CONTROLLER TO PCS									
PLC TO SERCOM COMMUNICATION REGISTERS									
	SERCOM STATUS REGISTER			N324	50				
	SERCOM INDEX REGISTER			N324	51				
	SERCOM RESPONSE REGISTER			N324	52				
	PLC STATUS REGISTER			N324	53				
	PLC INDEX REGISTER			N324	54				
	PLC COMMAND REGISTER			N324	55				
PCS To DMS									
	TRANSMIT MESSAGE TO SUPV.			N32	0	3			
	TRANSMIT MESSAGE 5.3.1			N32	10	12			
	TRANSMIT MESSAGE 5.5.3			N32	2	5			
	TRANSMIT MESSAGE 5.5.10			N32	14	0			
5.3.1	DRUM LOCATION	NETCOM		N32	250				
	DRUM PIN			N32	251-258				
5.5.3	PICKUP LOCATION	NETCOM		N32	30				
	DROPOFF LOCATION			N32	31				
	DRUM PIN			N32	32-39				
5.5.9	RELEASE AGV	NETCOM		N32	10	6			
5.5.10	ADVANCE AGV	NETCOM		N32	14	0			
DMS TO PCS									
	MESSAGE 5.4.1 RECEIVED FROM DMS			N32	13	0			
5.4.1	DRUM LOCATION			N32	215				
	DRUM PIN			N32	216-224				
LIFT TABLE INTERNAL DRUM TRACKING TABLES									
LT-09-202B	DRUM PIN			N32	50-57				
	DRUM WEIGHT			N32	58				
	DRUM ROUTE			N32	59-60				
	DRUM STATUS			N32	61				
LT-09-203C	DRUM PIN			N32	62-69				
	DRUM WEIGHT			N32	70				

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	DRUM ROUTE			N32	71-72				
	DRUM STATUS			N32	73				
LT-09-203B	DRUM PIN			N32	74-81				
	DRUM WEIGHT			N32	82				
	DRUM ROUTE			N32	83-84				
	DRUM STATUS			N32	85				
LT-09-202D	DRUM PIN			N32	86-93				
	DRUM WEIGHT			N32	94				
	DRUM ROUTE			N32	95-96				
	DRUM STATUS			N32	97				
LT-09-202E	DRUM PIN			N32	98-105				
	DRUM WEIGHT			N32	106				
	DRUM ROUTE			N32	107-108				
	DRUM STATUS			N32	109				
LT-09-201A	DRUM PIN			N32	110-117				
	DRUM WEIGHT			N32	118				
	DRUM ROUTE			N32	119-120				
	DRUM STATUS			N32	121				
LT-09-201B	DRUM PIN			N32	122-129				
	DRUM WEIGHT			N32	130				
	DRUM ROUTE			N32	131-132				
	DRUM STATUS			N32	133				
LT-09-201C	DRUM PIN			N32	134-141				
	DRUM WEIGHT			N32	142				
	DRUM ROUTE			N32	143-144				
	DRUM STATUS			N32	145				
MISCELLANEOUS TABLES									
HANDHELD BAR CODE SCANNER #1									
	SCAN IS A BAR CODE			N32	20	11			
	SCANNER AT ENTRY LIFT TABLE LOCATION			N32	21	0			
	SCANNER AT EMPTY DRUM COMPACT LIFT TABLE LOCATION			N32	21	1			

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	SCANNER AT SORTING RWM TRANSFER LIFT TABLE LOCATION			N32	21	2			
	SCANNER AT WASTE LOADOUT #1 LIFT TABLE LOCATION			N32	21	3			
	SCANNER AT WASTE LOADOUT #2 LIFT TABLE LOCATION			N32	21	4			
	SCANNER AT AGV HOLD POINT LOCATION			N32	21	5			
	SCANNER AT RWM LIFT TABLE 201A LOCATION			N32	21	6			
	SCANNER AT RWM LIFT TABLE 201B LOCATION			N32	21	7			
	SCANNER AT RWM LIFT TABLE 201C LOCATION			N32	21	8			
	SCANNER #1 SCANNED DRUM PIN			N32	225-237				
HANDHELD BAR CODE SCANNER #2									
	SCAN IS A BAR CODE			N32	22	11			
	SCANNER AT ENTRY LIFT TABLE LOCATION			N32	23	4			
	SCANNER AT EMPTY DRUM COMPACT LIFT TABLE LOCATION			N32	23	5			
	SCANNER AT SORTING RWM TRANSFER LIFT TABLE LOCATION			N32	23	6			
	SCANNER AT WASTE LOADOUT #1 LIFT TABLE LOCATION			N32	23	7			
	SCANNER AT WASTE LOADOUT #2 LIFT TABLE LOCATION			N32	23	8			
	SCANNER AT AGV HOLD POINT LOCATION			N32	23	3			
	SCANNER AT RWM LIFT TABLE 201A LOCATION			N32	23	0			
	SCANNER AT RWM LIFT TABLE 201B LOCATION			N32	23	1			
	SCANNER AT RWM LIFT TABLE 201C LOCATION			N32	23	2			
	SCANNER #2 SCANNED DRUM PIN			N32	259-271				
DRUM DATA BUFFER STORAGE				N32	238-249				
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
09-XS-221AB/A	E-STOP ROPE SWITCH PULLED - TRU RWM LIFT TABLE 201A			N329	00	00-01	N584	11	12
09-XS-223AB/A	E-STOP ROPE SWITCH PULLED - TRU RWM LIFT TABLE 201B			N329	00	02-03	N584	7	12
09-XS-225AB/A	E-STOP ROPE SWITCH PULLED - TRU RWM LIFT TABLE 201C			N329	00	04-05	N584	0	4
09-XS-235AB/A	E-STOP ROPE SWITCH PULLED - TRU ENTRY LIFT TABLE 202B			N329	00	06-07	N504	6	11
09-XS-239AB/A	E-STOP ROPE SWITCH PULLED - TRU EXIT LIFT TABLE 202D			N329	00	08-09	N544	7	12
09-XS-243AB/A	E-STOP ROPE SWITCH PULLED - TRU RWM TRANSFER PORT LIFT TABLE 203B			N329	00	10-11	N514	7	8
09-XS-245AB/A	E-STOP ROPE SWITCH PULLED - TRU EMPTY LOADOUT LIFT TABLE 203C			N329	00	12-13	N534	11	8
09-XS-247AB/A	E-STOP ROPE SWITCH PULLED - TRU EXIT LIFT TABLE 202E			N329	00	14-15	N544	10	12
09-ZS-221F/A	CONVEYOR FORWARD FAILED - TRU RWM LIFT TABLE 201A			N329	01	00-01	N584	11	8
09-ZS-223F/A	CONVEYOR FORWARD FAILED - TRU RWM LIFT TABLE 201B			N329	01	02-03	N584	7	8
09-ZS-225F/A	CONVEYOR FORWARD FAILED - TRU RWM LIFT TABLE 201C			N329	01	04-05	N584	0	0
09-ZS-235F/A	CONVEYOR FORWARD FAILED - TRU ENTRY LIFT TABLE 202B			N329	01	06-07	N504	6	7

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
09-ZS-239F/A	CONVEYOR FORWARD FAILED - TRU EXIT LIFT TABLE 202D			N329	01	08-09	N544	7	8
09-ZS-243F/A	CONVEYOR FORWARD FAILED - TRU RWM TRANSFER PORT LIFT TABLE 203B			N329	01	10-11	N514	7	4
09-ZS-245F/A	CONVEYOR FORWARD FAILED - TRU EMPTY LOADOUT LIFT TABLE 203C			N329	01	12-13	N534	11	4
09-ZS-247F/A	CONVEYOR FORWARD FAILED - TRU EXIT LIFT TABLE 202E			N329	01	14-15	N544	10	8
09-ZS-221E/A	CONVEYOR REVERSE FAILED - TRU RWM LIFT TABLE 201A			N329	02	00-01	N584	11	9
09-ZS-223E/A	CONVEYOR REVERSE FAILED - TRU RWM LIFT TABLE 201B			N329	02	02-03	N584	7	9
09-ZS-225E/A	CONVEYOR REVERSE FAILED - TRU RWM LIFT TABLE 201C			N329	02	04-05	N584	0	1
09-ZS-235E/A	CONVEYOR REVERSE FAILED - TRU ENTRY LIFT TABLE 202B			N329	02	06-07	N504	6	8
09-ZS-239E/A	CONVEYOR REVERSE FAILED - TRU EXIT LIFT TABLE 202D			N329	02	08-09	N544	7	9
09-ZS-243E/A	CONVEYOR REVERSE FAILED - TRU RWM TRANSFER PORT LIFT TABLE 203B			N329	02	10-11	N514	7	5
09-ZS-245E/A	CONVEYOR REVERSE FAILED - TRU EMPTY LOADOUT LIFT TABLE 203C			N329	02	12-13	N534	11	5
09-ZS-247E/A	CONVEYOR REVERSE FAILED - TRU EXIT LIFT TABLE 202E			N329	02	14-15	N544	10	9
09-ZS-221D/A	LIFT FAILED TO RAISE - TRU RWM LIFT TABLE 201A			N329	03	00-01	N584	11	10
09-ZS-223D/A	LIFT FAILED TO RAISE - TRU RWM LIFT TABLE 201B			N329	03	02-03	N584	7	10
09-ZS-225D/A	LIFT FAILED TO RAISE - TRU RWM LIFT TABLE 201C			N329	03	04-05	N584	0	2
09-ZS-235D/A	LIFT FAILED TO RAISE - TRU ENTRY LIFT TABLE 202B			N329	03	06-07	N504	6	9
09-ZS-239D/A	LIFT FAILED TO RAISE - TRU EXIT LIFT TABLE 202D			N329	03	08-09	N544	7	10
09-ZS-243D/A	LIFT FAILED TO RAISE - TRU RWM TRANSFER PORT LIFT TABLE 203B			N329	03	10-11	N514	7	6
09-ZS-245D/A	LIFT FAILED TO RAISE - TRU EMPTY LOADOUT LIFT TABLE 203C			N329	03	12-13	N534	11	6
09-ZS-247D/A	LIFT FAILED TO RAISE - TRU EXIT LIFT TABLE 202E			N329	03	14-15	N544	10	10
09-ZS-221C/A	LIFT FAILED TO LOWER - TRU RWM LIFT TABLE 201A			N329	04	00-01	N584	11	11
09-ZS-223C/A	LIFT FAILED TO LOWER - TRU RWM LIFT TABLE 201B			N329	04	02-03	N584	7	11
09-ZS-225C/A	LIFT FAILED TO LOWER - TRU RWM LIFT TABLE 201C			N329	04	04-05	N584	0	3
09-ZS-235C/A	LIFT FAILED TO LOWER - TRU ENTRY LIFT TABLE 202B			N329	04	06-07	N504	6	10
09-ZS-239C/A	LIFT FAILED TO LOWER - TRU EXIT LIFT TABLE 202D			N329	04	08-09	N544	7	11
09-ZS-243C/A	LIFT FAILED TO LOWER - TRU RWM TRANSFER PORT LIFT TABLE 203B			N329	04	10-11	N514	7	7
09-ZS-245C/A	LIFT FAILED TO LOWER - TRU EMPTY LOADOUT LIFT TABLE 203C			N329	04	12-13	N534	11	7
09-ZS-247C/A	LIFT FAILED TO LOWER - TRU EXIT LIFT TABLE 202E			N329	04	14-15	N544	10	11
09-ZL-221C	LIFT TABLE DOWN OVERTRAVEL			N329	05	00-01	N584	8	0
09-ZL-221D	LIFT TABLE UP OVERTRAVEL			N329	05	02-03	N584	8	1
09-ZL-223C	LIFT TABLE DOWN OVERTRAVEL			N329	05	04-05	N584	8	2
09-ZL-223D	LIFT TABLE UP OVERTRAVEL			N329	05	06-07	N584	8	3
09-ZL-225C	LIFT TABLE DOWN OVERTRAVEL			N329	05	08-09	N584	8	4
09-ZL-225D	LIFT TABLE UP OVERTRAVEL			N329	05	10-11	N584	8	5
09-ZL-235C	LIFT TABLE DOWN OVERTRAVEL			N329	05	12-13	N504	6	12
09-ZL-235D	LIFT TABLE UP OVERTRAVEL			N329	05	14-15	N504	6	13
09-ZL-239C	LIFT TABLE DOWN OVERTRAVEL			N329	06	00-01	N544	7	13
09-ZL-239D	LIFT TABLE UP OVERTRAVEL			N329	06	02-03	N544	7	14
09-ZL-243C	LIFT TABLE DOWN OVERTRAVEL			N329	06	04-05	N514	25	7
09-ZL-243D	LIFT TABLE UP OVERTRAVEL			N329	06	06-07	N514	25	8

LCU 103 File 32 PLC Memory Map - Lift Tables in TRU Gloveboxes

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
09-ZL-245C	LIFT TABLE DOWN OVERTRAVEL			N329	06	08-09	N534	11	9
09-ZL-245D	LIFT TABLE UP OVERTRAVEL			N329	06	10-11	N534	11	10
09-ZS-247C	LIFT TABLE DOWN OVERTRAVEL			N329	06	12-13	N544	10	12
09-ZS-247D	LIFT TABLE UP OVERTRAVEL			N329	06	14-15	N544	10	13
	TRU GEN EXITS UNAVAILABLE			N329	07	00-01			
	LIFT TABLE LT-09-201A DRUM TRANSFER FAILURE			N329	07	02-03			
	LIFT TABLE LT-09-201B DRUM TRANSFER FAILURE			N329	07	04-05			
	LIFT TABLE LT-09-201C DRUM TRANSFER FAILURE			N329	07	06-07			
	LIFT TABLE LT-09-202B DRUM TRANSFER FAILURE			N329	07	08-09			
	LIFT TABLE LT-09-202D DRUM TRANSFER FAILURE			N329	07	10-11			
	LIFT TABLE LT-09-203B DRUM TRANSFER FAILURE			N329	07	12-13			
	LIFT TABLE LT-09-203C DRUM TRANSFER FAILURE			N329	07	14-15			
	LIFT TABLE LT-09-202E DRUM TRANSFER FAILURE			N329	08	00-01			
	LIFT TABLE LT-09-201A SERVO MOTOR POWER FAIL - REHOME 201A			N329	08	02-03	N584	7	13
	LIFT TABLE LT-09-201B SERVO MOTOR POWER FAIL - REHOME 201B			N329	08	04-05	N584	7	14
	LIFT TABLE LT-09-201C SERVO MOTOR POWER FAIL - REHOME 201C			N329	08	06-07	N584	7	15
	LIFT TABLE LT-09-202B SERVO MOTOR POWER FAIL - REHOME 202B			N329	08	08-09	N504	6	14
	LIFT TABLE LT-09-202D SERVO MOTOR POWER FAIL - REHOME 202D			N329	08	10-11	N544	7	15
	LIFT TABLE LT-09-203B SERVO MOTOR POWER FAIL - REHOME 203B			N329	08	12-13	N514	7	9
	LIFT TABLE LT-09-203C SERVO MOTOR POWER FAIL - REHOME 203C			N329	08	14-15	N534	11	11
	LIFT TABLE LT-09-202E SERVO MOTOR POWER FAIL - REHOME 202E			N329	09	00-01	N544	10	14
END OF LCU 103 FILE 32 MEMORY MAP									

LCU 103 File 33 PLC Memory Map - Empty Drum Conveyors

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS									
EMPTY DRUM STAGING CONVEYOR 203 (85-GALLON)									
09-HS-222A	LOCAL-OFF-REMOTE (L-O-R) SWITCH - CONVEYOR	DI	I:10/00				N95	10	00
09-HS-222B	LOCAL-OFF-REMOTE (L-O-R) SWITCH - INDEXER	DI	I:10/01				N95	10	01
09-ZS-222C	AGV HANDSHAKE SIGNAL S1	DI	I:10/05				N95	10	05
09-ZS-222E	INDEX POSITION SENSOR	DI	I:10/06				N95	10	06
09-XS-222A/B	ROPE SWITCH A/B	DI	I:10/02				N95	10	02
09-ZS-222B	AGV SIDE DRUM POSITION SWITCH	DI	I:10/04				N95	10	04
09-ZS-222A	CONVEYOR FULL POSITION SWITCH	DI	I:10/03				N95	10	03
CV-09-203/FS	CONVEYOR MOTOR RUNNING FORWARD	DI	I:10/07				N95	10	07
CV-09-203/RS	CONVEYOR MOTOR RUNNING REVERSE	DI	I:10/10				N95	10	10
OUTPUTS									
CV-09-203F	CONVEYOR MOTOR RUN FORWARD	DO	O:40/04				N95	40	04
CV-09-203R	CONVEYOR MOTOR RUN REVERSE	DO	O:40/05				N95	40	05
09-ZY-222C	AGV HANDSHAKE SIGNAL S1	DO	O:40/02				N95	40	02
RTAP CONTROL POINTS									
	AUTO/MANUAL MODE						N330	0	0
	CONVEYOR RUN FORWARD/REVERSE						N330	0	1
	CALL CONVEYOR RUN						N330	0	2
RTAP STATUS POINTS									
	AUTO/MANUAL CONTROL STATUS						N330	1	0
EMPTY DRUM STAGING CONVEYOR 204 (55-GALLON)									
09-HS-224A	LOCAL-OFF-REMOTE (L-O-R) SWITCH - CONVEYOR	DI	I:10/11				N95	10	11
09-HS-224B	LOCAL-OFF-REMOTE (L-O-R) SWITCH - INDEXER	DI	I:10/12				N95	10	12
09-ZS-224C	AGV HANDSHAKE SIGNAL S1	DI	I:10/16				N95	10	16
09-ZS-224E	INDEX POSITION SENSOR	DI	I:10/17				N95	10	17
09-XS-224A/B	ROPE SWITCH A/B	DI	I:10/13				N95	10	13
09-ZS-224B	AGV SIDE DRUM POSITION SWITCH	DI	I:10/15				N95	10	15
09-ZY-224C	AGV HANDSHAKE SIGNAL S1	DO	O:40/10				N95	40	10
RTAP CONTROL POINTS									
	AUTO/MANUAL MODE						N330	2	0

LCU 103 File 33 PLC Memory Map - Empty Drum Conveyors

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	CALL CONVEYOR RUN						N330	2	2
RTAP STATUS POINTS									
	AUTO/MANUAL CONTROL STATUS						N330	3	0
PCS To DMS									
	TRANSMIT NETCOM MESSAGE TO SUPV.			N33	0	1			
	TRANSMIT MESSAGE 5.3.1			N33	0	10			
	TRANSMIT MESSAGE 5.3.4			N33	0	2			
5.3.1	DRUM LOCATION			N33	25				
	DRUM PIN			N33	26-33				
5.3.4	DRUM PICKUP LOCATION			N33	10				
	DRUM DROPOFF LOCATION			N33	11				
	DRUM PIN			N33	12-19				
5.5.9	TRANSMIT MESSAGE 5.5.9			N33	1	0			
DMS TO PCS									
MISCELLANEOUS DRUM TABLES									
85-GALLON STAGING CONVEYOR									
POSITION 1	DRUM PIN			N33	50-57				
	DRUM WEIGHT			N33	58				
	DRUM ROUTE			N33	59-60				
	DRUM STATUS			N33	61				
POSITION 2	DRUM PIN			N33	62-69				
	DRUM WEIGHT			N33	70				
	DRUM ROUTE			N33	71-72				
	DRUM STATUS			N33	73				
POSITION 3	DRUM PIN			N33	74-81				
	DRUM WEIGHT			N33	82				
	DRUM ROUTE			N33	83-84				
	DRUM STATUS			N33	85				
POSITION 4	DRUM PIN			N33	86-93				
	DRUM WEIGHT			N33	94				
	DRUM ROUTE			N33	95-96				

LCU 103 File 33 PLC Memory Map - Empty Drum Conveyors

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	DRUM STATUS			N33	97				
POSITION 5	DRUM PIN			N33	98-105				
	DRUM WEIGHT			N33	106				
	DRUM ROUTE			N33	107-108				
	DRUM STATUS			N33	109				
POSITION 6	DRUM PIN			N33	110-117				
	DRUM WEIGHT			N33	118				
	DRUM ROUTE			N33	119-120				
	DRUM STATUS			N33	121				
55-GALLON STAGING CONVEYOR									
POSITION 1	DRUM PIN			N33	122-129				
	DRUM WEIGHT			N33	130				
	DRUM ROUTE			N33	131-132				
	DRUM STATUS			N33	133				
POSITION 2	DRUM PIN			N33	134-141				
	DRUM WEIGHT			N33	142				
	DRUM ROUTE			N33	143-144				
	DRUM STATUS			N33	145				
POSITION 3	DRUM PIN			N33	146-162				
	DRUM WEIGHT			N33	163				
	DRUM ROUTE			N33	164-165				
	DRUM STATUS			N33	166				
POSITION 4	DRUM PIN			N33	167-174				
	DRUM WEIGHT			N33	175				
	DRUM ROUTE			N33	176-177				
	DRUM STATUS			N33	178				
POSITION 5	DRUM PIN			N33	179-186				
	DRUM WEIGHT			N33	187				
	DRUM ROUTE			N33	188-189				
	DRUM STATUS			N33	190				
POSITION 6	DRUM PIN			N33	191-198				

LCU 103 File 33 PLC Memory Map - Empty Drum Conveyors

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	DRUM WEIGHT			N33	199				
	DRUM ROUTE			N33	200-201				
	DRUM STATUS			N33	202				
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
09-XS-222AB/A	E-STOP ROPE SWITCH PULLED - EMPTY DRUM CONV 203 (85-GAL)			N339	00	00-01			
	FAILED TO TRANSFER DRUM - EMPTY DRUM CONV 203 (85-GAL)			N339	00	02-03			
09-XS-224AB/A	E-STOP ROPE SWITCH PULLED - EMPTY DRUM CONV 204 (55-GAL)			N339	00	04-05			
	FAILED TO TRANSFER DRUM - EMPTY DRUM CONV 204 (55-GAL)			N339	00	06-07			
END OF LCU 103 FILE 33 MEMORY MAP									

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register Data File	Internal Register Word	Internal Register Bit	PLC <--> Ext. Dev. Reg. Data File	PLC <--> Ext. Dev. Reg. Word	PLC <--> Ext. Dev. Reg. Bit
HARDWIRED TO/FROM PCS									
DRUM ENTRY/EXIT PORT DO-07-301									
07-ZSC-800A	DRUM PORT CLOSED AND LOCKED	DI	I:21/03				N95	21	03
07-ZSC-800B	DRUM PORT CLOSED AND LOCKED	DI	I:21/10				N95	21	10
07-ZSC-801	DOOR DOWN	DI	I:21/11				N95	21	11
07-ZSO-801	DRUM PORT ROTATED	DI	I:21/04				N95	21	04
07-ZS-803A	DRUM DOOR CLOSED	DI	I:21/05				N95	21	05
07-ZS-803B	DRUM DOOR IN POSITION	DI	I:21/06				N95	21	06
07-ZS-803C	DRUM DOOR OPEN	DI	I:21/07				N95	21	07
07-PS-803	SYSTEM ESTABLISHED ADEQUATE VACUUM	DI	I:21/01				N95	21	01
07-ZS-811	DRUM LID IN POSITION	DI	I:21/02				N95	21	02
07-ZSO-812A	DRUM CENTERING DEVICE RETRACTED	DI	I:30/00				N95	30	00
07-ZSO-812B	DRUM CENTERING DEVICE RETRACTED	DI	I:30/01				N95	30	01
07-FEV-302	DRUM CENTERING	DO	O:45/10				N95	45	10
07-FEV-800A/L*	DRUM ENTRY/EXIT PORT LOCK	DO	O:104/01				N95	104	1
07-FEV-800A/U	DRUM ENTRY/EXIT PORT UNLOCK	DO	O:104/00				N95	104	0
07-FEV-800B/O*	DRUM ENTRY/EXIT PORT OPEN	DO	O:104/02				N95	104	2
07-FEV-800B/C*	DRUM ENTRY/EXIT PORT CLOSE	DO	O:104/03				N95	104	3
07-FEV-800D/V*	DRUM ENTRY/EXIT PORT DRUM LID REMOVAL SYSTEM VACUUM	DO	O:104/04				N95	104	4
07-FEV-800I/E*	DRUM ENTRY/EXIT PORT LID DETACH EXTEND	DO	O:104/17				N95	104	17
07-FEV-800I/R*	DRUM ENTRY/EXIT PORT LID DETACH RETRACT	DO	O:104/16				N95	104	16
07-FEV-800J/C*	DRUM ENTRY/EXIT PORT DOOR CLOSE	DO	O:105/00				N95	105	0
07-FEV-800J/O*	DRUM ENTRY/EXIT PORT DOOR OPEN	DO	O:105/01				N95	105	1
07-FEV-801/A	DRUM ENTRY/EXIT PORT DOOR CLOSE PRESSURE VENT	DO	O:45/12				N95	45	12
07-FEV-801/B	ENTRY/EXIT PORT DOOR OPEN PRESSURE VENT	DO	O:45/11				N95	45	11
07-FEY-800F*	DRUM ENTRY/EXIT PORT VACUUM ISOLATION	DO	O:104/10				N95	104	10
DRUM ENTRY TRANSFER ASSEMBLY MOTOR #1 DH-07-302/M1									
07-ZS-302	DRUM ENTRY TRANSFER ASSEMBLY MOTOR #1 CLUTCH TRIPPED	DI	I:20/17				N95	20	17
DH-07-302M1/L	DRUM TRANSFER ASSEMBLY MOTOR #1 "LOWER"	DO	O:45/04				N95	45	04
DRUM ENTRY TRANSFER ASSEMBLY DH-07-302									
07-ZSC-806	DRUM TR. DEVICE UPPER GRAB CLOSED	DI	I:20/11				N95	20	11

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
07-ZSO-806A	DRUM TR. DEVICE UPPER GRAB OPEN	DI	I:20/13				N95	20	13
07-ZS-807A	DRUM TR. DEVICE UPPER GRAB RAISED	DI	I:20/02				N95	20	02
07-ZS-807B	DRUM TR. DEVICE DRUM ENTERS SPHINCTER	DI	I:20/03				N95	20	03
07-ZS-807C	DRUM TR. DEVICE DRUM IN SPHINCTER	DI	I:20/04				N95	20	04
07-ZS-807D	DRUM TR. DEVICE DRUM HANDOVER	DI	I:20/05				N95	20	05
07-ZS-808A	DRUM TR. DEVICE DRUM HANDOVER	DI	I:20/06				N95	20	06
07-ZS-808B	DRUM TR. DEVICE DRUM IN SPHINCTER	DI	I:20/07				N95	20	07
07-ZS-808C	DRUM TR. DEVICE DRUM DOWN TO CONVEYOR	DI	I:20/10				N95	20	10
07-ZSC-809	DRUM TR. DEVICE LOWER GRAB CLOSED	DI	I:20/12				N95	20	12
07-ZSO-809A	DRUM TR. DEVICE LOWER GRAB OPEN	DI	I:20/15				N95	20	15
07-ZSO-809B	DRUM TR. DEVICE LOWER GRAB OPEN	DI	I:20/16				N95	20	16
07-PS-395A	DRUM TR. DEVICE UPPER GRAB PRESS.	DI	I:17/17				N95	17	17
07-PS-395B	DRUM TR. DEVICE LOWER GRAB PRESS.	DI	I:20/00				N95	20	00
07-FEV-395A/O	DRUM TR. DEVICE UPPER GRAB OPEN	DO	O:45/00				N95	45	00
07-FEV-395A/C	DRUM TR. DEVICE UPPER GRAB CLOSED	DO	O:45/01				N95	45	01
07-FEV-395B/O	DRUM TR. DEVICE LOWER GRAB OPEN	DO	O:45/03				N95	45	03
07-FEV-395B/C	DRUM TR. DEVICE LOWER GRAB CLOSED	DO	O:45/02				N95	45	02
MONORAIL HOIST CV-07-301A									
PC-07-006/FLS	TROLLEY FORWARD & LOW SPEED	DI	I:17/06				N95	17	06
PC-07-006/F2S	TROLLEY FORWARD - SPEED 2	DI	I:17/02				N95	17	02
PC-07-006/F3S	TROLLEY FORWARD - SPEED 3	DI	I:17/03				N95	17	03
PC-07-006/F4S	TROLLEY FORWARD - SPEED 4	DI	I:17/04				N95	17	04
PC-07-006/F5S	TROLLEY FORWARD - SPEED 5	DI	I:17/05				N95	17	05
PC-07-006/RLS	TROLLEY REVERSE & LOW SPEED	DI	I:17/13				N95	17	13
PC-07-006/R2S	TROLLEY REVERSE - SPEED 2	DI	I:17/07				N95	17	07
PC-07-006/R3S	TROLLEY REVERSE - SPEED 3	DI	I:17/10				N95	17	10
PC-07-006/R4S	TROLLEY REVERSE - SPEED 4	DI	I:17/11				N95	17	11
PC-07-006/R5S	TROLLEY REVERSE - SPEED 5	DI	I:17/12				N95	17	12
PC-07-006/U	HOIST RAISE COMMAND	DI	I:17/14				N95	17	14
PC-07-006/D	HOIST LOWER COMMAND	DI	I:17/01				N95	17	01
07-ZS-802A	TROLLEY POSITION	DI	I:16/16				N95	16	16

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
07-ZS-802B	TROLLEY POSITION	DI	I:16/17				N95	16	17
07-ZS-803C	HOIST RAISED	DI	I:17/00				N95	17	00
PC-07-006/P1	TROLLEY & SPHINCTER PORT POS. LED	DO	O:44/10				N95	44	10
PC-07-006/P2	TROLLEY @ MIDWAY POSITION LED	DO	O:44/11				N95	44	11
PC-07-006/P3	TROLLEY @ ENTRY PORT POS. LED	DO	O:44/12				N95	44	12
CR-07-301A/SF	TROLLEY MOTOR FORWARD & LOW SPEED	DO	O:44/04				N95	44	04
CR-07-301A/SR	TROLLEY MOTOR REVERSE & LOW SPEED	DO	O:44/05				N95	44	05
CR-07-301A/S2	TROLLEY MOTOR SPEED 2	DO	O:43/17				N95	43	17
CR-07-301A/S3	TROLLEY MOTOR SPEED 3	DO	O:44/00				N95	44	00
CR-07-301A/S4	TROLLEY MOTOR SPEED 4	DO	O:44/01				N95	44	01
CR-07-301A/S5	TROLLEY MOTOR SPEED 5	DO	O:44/02				N95	44	02
PC-07-006/US	HOIST RAISED POSITION LED	DO	O:44/13				N95	44	13
PC-07-006/ES	PENDANT ENABLED LED	DO	O:44/07				N95	44	07
CR-07-301A/SU	HOIST MOTOR RAISE	DO	O:44/06				N95	44	06
CR-07-301A/SD	HOIST MOTOR LOWER	DO	O:44/03				N95	44	03
DRUM LIFTER DH-07-301									
PC-07-006/O	DRUM LIFTER OPEN COMMAND	DI	I:017/02				N95	01	/0
PC-07-006/C	DRUM LIFTER CLOSE COMMAND	DI	I:017/03				N95	01	/0
07-ZSO-804	DRUM LIFTER OPENED	DI	I:17/16				N95	17	16
07-ZSC-804	DRUM LIFTER CLOSED	DI	I:17/15				N95	17	15
PC-07-006/OS	DRUM LIFTER OPENED LED	DO	O:44/17				N95	44	17
PC-07-006/CS	DRUM LIFTER CLOSED LED	DO	O:44/16				N95	44	16
07-FEV-800C/O	DRUM LIFTER OPEN	DO	O:104/14				N95	10	/1
07-FEV-800C/C	DRUM LIFTER CLOSED	DO	O:104/15				N95	10	/1
SPHINCTER ENTRY PORT DO-07-302									
07-PSLL-801	SPHINCTER PORT DOOR SEAL DEFLATED	DI	I:21/13				N95	21	13
07-PSL-800	SPHINCTER PORT DOOR SEAL INFLATED	DI	I:21/12				N95	21	12
07-ZSC-805	SPHINCTER PORT DOOR CLOSED	DI	I:21/14				N95	21	14
07-ZSO-805	SPHINCTER PORT DOOR OPENED	DI	I:21/15				N95	21	15
07-FEV-800G	DRUM LIFTER VAC. ISOLATION	DO	O:104/12				N95	104	12
07-FEV-800E/O	SPHINCTER DOOR OPEN	DO	O:104/07				N95	104	7

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register Data File	Word	Bit	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
07-FEV-800E/C	SPHINCTER DOOR CLOSE	DO	O:104/06				N95	104	6
07-FEV-800C/I	SPHINCTER DOOR SEAL INFLATE	DO	O:105/03				N95	105	3
07-FEV-800C/D	SPHINCTER DOOR SEAL DEFLATE	DO	O:105/02				N95	105	2
STAND ALONE INSTRUMENTS									
07-PDISL-303	LOW DIFFERENTIAL PRESSURE	DI	I:21/16				N95	21	16
07-NE-300	BAR CODE SCANNER	DI							
07-ZS-810	DRUM TRANSFER CAR UNDER LOWER DRUM GRAB	DI	I:22/03				N95	22	03
07-ZS-305	DRUM IN POSITION ON TRANSFER CAR	DI	I:20/01				N95	20	01
END OF LCU 10	LIGHT CURTAIN	DI	I:21/17				N95	21	17
07-XS-301B	LIGHT CURTAIN	DI	I:22/00				N95	22	00
07-FIT-305	EXHAUST BYPASS FLOW	AI	I:06/01				N95	06	01
07-PDA-303	LOW DIFFERENTIAL PRESSURE WARNING BEACON	DO	O:45/13				N95	45	13
07-FEV-394A	PNEUMATIC VALVE MANIFOLD SP.301 80 PSI AIR SUPPLY	DO	O:45/15				N95	45	15
07-FEV-394B	PNEUMATIC VALVE MANIFOLD SP.301 20 PSI AIR SUPPLY	DO	O:45/14				N95	45	14
OIU SCREEN INTERFACE									
MAIN									
INFORMATION		BTW	N504:00/00				N504	00	00
OPERATORS	OVERPACK MENU		I:061						
	SINGLE DRUM MENU		I:061						
	TROLLEY MENU		I:061						
	TRANSFER ASSEMBLY MENU		I:061						
	ENTRY HOLD POINT MENU		I:061						
STATUS	SYSTEM INITIALIZED	BTW	N504:02/00				N504	02	00
	SYSTEM NOT INITIALIZED	BTW	N504:02/01				N504	02	01
	SEQUENCE FAILED	BTW	N504:02/15				N504	02	15
OVERPACK									
INFORMATION	DRUM ID	BTW	N504:30-38				N504	30-38	
OPERATORS	START ENTRY SEQUENCE	BTR	N505:01/00				N505	01	00
	OPEN AND DELID	BTR	N505:01/01				N505	01	01
	CLOSE & RELID CLEAN	BTR	N505:01/02				N505	01	02
	CLOSE & RELID CONTAMINATED	BTR	N505:01/03				N505	01	03

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	LOWER LIFT TABLE	BTR	N505:01/04				N505	01	04
	INNER DRUM ID VERIFIED	BTR	N505:01/05				N505	01	05
	DRUM READY FOR PICKUP	BTR	N505:01/06				N505	01	06
	ALARMS	BTR	N505:01/07				N505	01	07
	ALARM PILOT LIGHT	BTW	N504:03/00				N504	03	00
	MAIN MENU		I:061						
STATUS	DRUM ENTRY SEQUENCE IN PROGRESS	BTW	N504:05/00				N504	05	00
	DRUM ENTRY SEQUENCE COMPLETE	BTW	N504:05/01				N504	05	01
	PORT OPEN SEQUENCE IN PROGRESS	BTW	N504:05/02				N504	05	02
	PORT OPEN SEQUENCE COMPLETE - PORT OPEN	BTW	N504:05/03				N504	05	03
	PORT CLOSE SEQUENCE IN PROGRESS	BTW	N504:05/04				N504	05	04
	PORT CLOSE SEQUENCE COMPLETE - PORT CLOSED	BTW	N504:05/05				N504	05	05
	DRUM EXIT SEQUENCE IN PROGRESS	BTW	N504:05/06				N504	05	06
	DRUM EXIT SEQUENCE COMPLETE	BTW	N504:05/07				N504	05	07
	DRUM AT LIFT TABLE	BTW	N504:05/08				N504	05	08
	NO DRUM AT LIFT TABLE	BTW	N504:05/09				N504	05	09
	SEQUENCE FAILED	BTW	N504:05/15				N504	05	15
TROLLEY									
INFORMATION		BTW	N504:10/00				N504	10	00
OPERATORS	SWAB POSITION	BTR	N505:03/00				N505	03	00
	TRANSFER ASSEMBLY	BTR	N505:03/01				N505	03	01
	ALARMS	BTR	N505:01/07				N505	01	07
	ALARM PILOT LIGHT	BTW	N504:03/00				N504	03	00
	MAIN MENU		I:061						
STATUS	DRUM TO DRUM TRANSFER IN PROGRESS	BTW	N504:11/00				N504	11	00
	DRUM TO DRUM TRANSFER COMPLETE - DRUM AT UPPER GRAB	BTW	N504:11/01				N504	11	01
	TROLLEY MOVING TO SWAB POSITION	BTW	N504:11/03				N504	11	03
	TROLLEY AT SWAB POSITION	BTW	N504:11/04				N504	11	04
	TROLLEY AT ENTRY POSITION	BTW	N504:11/05				N504	11	05
	SEQUENCE FAILED	BTW	N504:11/15				N504	11	15
XFER ASSEMBLY									

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register Data File	Word	Bit	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
INFORMATION		BTW	N504:13/00				N504	13	00
OPERATORS	LOWER TO CAR	BTR	N505:04/00				N505	04	00
	HANDOVER	BTR	N505:04/01				N505	04	01
	ALARMS	BTR	N505:01/07				N505	01	07
	ALARM PILOT LIGHT	BTW	N504:13/00				N504	13	00
STATUS	DRUM LOWER TO CAR SEQUENCE IN PROGRESS	BTW	N504:14/00				N504	14	00
	LOWER TO CAR SEQUENCE COMPLETE	BTW	N504:14/01				N504	14	01
	DRUM HANDOVER SEQUENCE IN PROGRESS	BTW	N504:14/02				N504	14	02
	DRUM HANDOVER SEQUENCE COMPLETE	BTW	N504:14/03				N504	14	03
	SEQUENCE FAILED	BTW	N504:14/15				N504	14	15
HOLD PT									
INFORMATION		BTW	N504:16/00				N504	16	00
OPERATORS	ADVANCE AGV	BTR	N505:05/00				N505	05	00
	RELEASE AGV	BTR	N505:05/01				N505	05	01
	MAIN MENU		I:061						
STATUS	AGV AT ENTRY HOLD POINT (OIU-12-104A)	BTW	N504:17/00				N504	17	00
ALARM SCREEN									
	RETURN TO CURRENT SCREEN		N505:09/00				N505	09	00
	INDIVIDUAL ACKNOWLEDGE		N505:09/01				N505	09	01
	GLOBAL ACKNOWLEDGE		N505:09/02				N505	09	02
	INDIVIDUAL ERASE		N505:09/03				N505	09	03
	GLOBAL ERASE		N505:09/04				N505	09	04
MAINTENANCE									
	DRUM CENTERING CLAMPS		N505:06/00				N505	06	00
	DRUM ENTRY/EXIT PORT LOCK		N505:06/01				N505	06	01
	DRUM ENTRY/EXIT PORT UNLOCK		N505:06/02				N505	06	02
	DRUM ENTRY/EXIT PORT OPEN		N505:06/03				N505	06	03
	DRUM ENTRY/EXIT PORT CLOSE		N505:06/04				N505	06	04
	DRUM LID REMOVAL SYSTEM VACUUM		N505:06/05				N505	06	05
	PORT LID DETACH EXTEND		N505:06/06				N505	06	06
	PORT LID DETACH RETRACT		N505:06/07				N505	06	07
	PORT DOOR CLOSE		N505:06/08				N505	06	08
	PORT DOOR OPEN		N505:06/09				N505	06	09
	PORT DOOR CLOSE PRESSURE VENT		N505:06/10				N505	06	10
	PORT DOOR OPEN PRESSURE VENT		N505:06/11				N505	06	11
	PORT VACUUM ISOLATION SOLENOID		N505:06/12				N505	06	12

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register Data File	Word	Bit	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
	DRUM TRANSFER ASSEMBLY MOTOR #1 "LOWER"		N505:06/13				N505	06	13
	DRUM TRANSFER ASSEMBLY MOTOR #1 "RAISE"		N505:06/14				N505	06	14
	DRUM TRANSFER ASSEMBLY MOTOR #2 "LOWER"		N505:07/10				N505	07	10
	DRUM TRANSFER ASSEMBLY MOTOR #2 "RAISE"		N505:07/00				N505	07	00
	UPPER GRAB OPEN		N505:07/01				N505	07	01
	UPPER GRAB CLOSE		N505:07/02				N505	07	02
	LOWER GRAB OPEN		N505:07/03				N505	07	03
	LOWER GRAB CLOSE		N505:07/04				N505	07	04
	LAMP TEST		N505:07/05				N505	07	05
	RAISE BOTH GRABS		N505:07/08				N505	07	08
	LOWER BOTH GRABS		N505:07/09				N505	07	09
	DRUM LIFTER VACUUM ISOLATION SOLENOID		N505:08/06				N505	08	06
	SPHINCTER DOOR OPEN		N505:08/07				N505	08	07
	SPHINCTER DOOR CLOSE		N505:08/08				N505	08	08
	SPHINCTER DOOR SEAL INFLATE		N505:08/09				N505	08	09
	SPHINCTER DOOR SEAL DEFLATE		N505:08/10				N505	08	10
	LOW DIFFERENTIAL PRESSURE WARNING BEACON		N505:08/11				N505	08	11
	PNEUMATIC VALVE MANIFOLD - 80 PSI		N505:08/12				N505	08	12
	PNEUMATIC VALVE MANIFOLD - 20 PSI		N505:08/13				N505	08	13
	EXHAUST BYPASS VALVE SOLENOID		N505:08/14				N505	08	14
	REHOME LIFT TABLE LT-09-202B		N505:10/13				N505	10	13
PCS TO DMS									
	TRANSMIT MESSAGE TO SUPV.			N32	0	3			
	TRANSMIT MESSAGE 5.3.4			N50	6	10			
5.3.4	DRUM LOCATION			N50	20				
	DRUM PIN			N50	21-28				
	DRUM CONTAMINATION STATUS			N50	29				
DMS TO PCS									
MISCELLANEOUS DRUM TABLES									
ENTRY GLOVEBOX DRUM TRACKING TABLE									
	DRUM PIN			N50	50-57				
	DRUM WEIGHT			N50	58				
	DRUM ROUTE			N50	59-60				
	DRUM STATUS			N50	61				
TRANSFER ASSEMBLY UPPER GRAB DRUM TRACKING TABLE									
	DRUM PIN			N50	62-69				

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	DRUM WEIGHT			N50	70				
	DRUM ROUTE			N50	71-72				
	DRUM STATUS			N50	73				
TRANSFER ASSEMBLY LOWER GRAB DRUM TRACKING TABLE									
	DRUM PIN			N50	74-81				
	DRUM WEIGHT			N50	82				
	DRUM ROUTE			N50	83-84				
	DRUM STATUS			N50	85				
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
07-ZSC-800AB/A	FAILED TO CLOSE/LOCK			N509	00	00-01	N504	06	05
07-ZSO-801/A	FAILED TO OPEN			N509	00	02-03	N504	06	02
07-ZSC-800/A	CLOSE AND LOCK POSITION NOT VERIFIED			N509	00	04-05	N504	06	06
07-PS-803/A	LOSS OF VACUUM			N509	00	06-07	N504	06	00
07-ZS-302/A	CLUTCH TRIPPED			N509	00	08-09	N504	15	09
07-ZS-303/A	CLUTCH TRIPPED			N509	00	10-11	N504	15	10
07-ZSO-806AB/	UPPER GRAP FAILED TO OPEN			N509	00	12-13	N504	15	05
07-ZSC-806/A	UPPER GRAP FAILED TO CLOSE			N509	00	14-15	N504	15	04
07-ZSO-809AB/	LOWER GRAP FAILED TO OPEN			N509	01	02-03	N504	15	01
07-ZSC-809/A	LOWER GRAP FAILED TO CLOSE			N509	01	04-05	N504	15	02
07-PS-395A/A	UPPER GRAB LOSS OF PRESSURE			N509	01	06-07	N504	15	06
07-PS-395B/A	LOWER GRAB LOSS OF PRESSURE			N509	01	08-09	N504	15	03
07-ZS-802C/A	LIFTER FAILED TO RAISE			N509	01	10-11	N504	12	00
07-ZS-802B/A	FAILED TO REACH ENTRY			N509	01	12-13	N504	06	04
07-ZS-802A/A	FAILED TO REACH MIDWAY			N509	01	14-15	N504	12	03
07-ZS-802AB/A	FAILED TO REACH SPHINCTER			N509	02	00-01	N504	12	02
07-ZSC-804/A	LIFTER FAILED TO CLOSE			N509	02	02-03	N504	06	01
07-PSL-800/A	LOSS OF PRESSURE			N509	02	04-05	N504	15	08
07-ZSC-805/A	FAILED TO CLOSE			N509	02	06-07	N504	15	07
07-PDISL-303/A	LOW GLOVEBOX DIFFERENTIAL PRESSURE			N509	02	08-09	N504		
11-FIT-305/A	LOW EXHAUST BYPASS FLOW			N509	02	10-11	N504		
	LIFT TABLE DOOR IN POSITION NOT VERIFIED			N509	02	12-13	N504	06	03
	FAILED TO EXTEND/RETRACT/ABNORMAL POSITION			N509	02	14-15	N504	12	01
END OF LCU 103 FILE 50 MEMORY MAP									

LCU 103 File 50 PLC Memory Map - TRU Entry Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <---> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS									
SORTING TABLE ST-07-302									
PCS TO SORTING TABLE SERVO MOTOR CONTROLLER									
ST-07-302/H	MOVE SORT TABLE TO HOME POSITION	B					N514	28	00
ST-07-302/T	MOVE SORT TABLE TO TIPPER POSITION	B					N514	28	01
ST-07-302/A	MOVE SORT TABLE TO ASSAY POSITION	B					N514	28	02
ST-07-302/RW	MOVE SORT TABLE TO RWM LOADOUT POSITION	B					N514	28	03
ST-07-302/W1	MOVE SORT TABLE TO WASTE LOADOUT POSITION 1	B					N514	28	04
ST-07-302/W2	MOVE SORT TABLE TO WASTE LOADOUT POSITION 2	B					N514	28	05
ST-07-302/SP	STOP SORTING TABLE	B					N514	28	06
SORTING TABLE SERVO MOTOR CONTROLLER TO PCS									
07-ZS-829	SORT TABLE AT END OF LIMIT POSITION	B							
07-ZS-870	SORT TABLE AT END OF LIMIT STOP/HOME	B							
ST-07-302/TS	SORT TABLE AT TIPPER POSITION	B					N515	16	00
ST-07-302/AS	SORT TABLE AT ASSAY POSITION	B					N515	16	01
ST-07-302/RWS	SORT TABLE AT RWM LOADOUT POSITION	B					N515	16	02
ST-07-302/W1S	SORT TABLE AT WASTE LOADOUT POSITION 1	B					N515	16	03
ST-07-302/W2S	SORT TABLE AT WASTE LOADOUT POSITION 2	B					N515	16	04
PLC TO SERCOM COMMUNICATIONS REGISTERS									
	SERCOM STATUS REGISTER			N54	12				
	SERCOM INDEX REGISTER			N54	13				
	SERCOM RESPONSE REGISTER			N54	14				
	PLC STATUS REGISTER			N54	15				
	PLC INDEX REGISTER			N54	16				
	PLC COMMAND REGISTER			N54	17				
DRUM TIPPER DH-07-303									
07-ZS-820A	DRUM GRAB CLOSED	DI	I:22/11				N95	22	11
07-ZS-820B	DRUM GRAB OPEN	DI	I:22/12				N95	22	12
DH-07-303M1/L	MOTOR LOWER	DO	O:46/11				N95	46	11
07-FEV-395C/O	DRUM GRAB OPEN	DO	O:46/03				N95	46	03
07-FEV-395C/C	DRUM GRAB CLOSE	DO	O:46/02				N95	46	02

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
PACKET TRAY DOOR DO-07-303									
07-ZS-327A	PACKET ASSAY DOOR CLOSED	DI	I:22/14				N95	22	14
07-ZS-327B	PACKET X-RAY DOOR CLOSED	DI	I:22/15				N95	22	15
ND-07-301/ES	PACKET X-RAY IN PROGRESS	DI					N95		
ND-07-302/ES	PACKET ASSAY IN PROGRESS	DI					N95		
07-FEV-837E/F	PACKET TRAY DOOR FORWARD	DO	O:102/10				N95	102	10
07-FEV-837E/R	PACKET TRAY DOOR REVERSE	DO	O:102/11				N95	102	11
07-FEV-837G/E	PACKET ASSAY TRAY EXTEND	DO	O:102/13				N95	102	13
07-FEV-837G/R	PACKET ASSAY TRAY RETRACT	DO	O:102/12				N95	102	12
07-FEV-837H/E	PACKET X-RAY TRAY EXTEND	DO	O:102/15				N95	102	15
07-FEV-837H/R	PACKET X-RAY TRAY RETRACT	DO	O:102/14				N95	102	14
ND-07-301/EN	PACKET X-RAY ENABLE	DO					N95		
ND-07-302/EN	PACKET ASSAY ENABLE	DO					N95		
DRUM LID/DELID FIXTURE RT-07-301									
07-ZS-826A	DRUM LID/DELID FIXTURE RAISED	DI	I:23/10				N95	23	10
07-ZS-826B	DRUM LID/DELID FIXTURE LOWERED	DI	I:23/11				N95	23	11
07-ZS-827A	DRUM LID/DELID FIXTURE ROTATION AT PARKK POSITION	DI	I:23/12				N95	23	12
07-ZS-827B	DRUM LID/DELID FIXTURE ROTATION INDEX POSITIONS	DI	I:23/13				N95	23	13
07-ZS-828A	DRUM LID/DELID FIXTURE IN PARK/RELID POSITION	DI	I:23/14				N95	23	14
07-ZS-828B	DRUM LID/DELID FIXTURE IN DELID POSITION	DI	I:23/15				N95	23	15
07-ZS-824A	DRUM LID/DELID FIXTURE SAW EXTENDED	DI	I:23/06				N95	23	06
07-ZS-824B	DRUM LID/DELID FIXTURE SAW RETRACTED	DI	I:23/07				N95	23	07
07-ZS-819A	DRUM LID/DELID FIXTURE CRIMP HEAD BACK	DI	I:23/16				N95	23	16
07-ZS-819B	DRUM LID/DELID FIXTURE CRIMP HEAD FORWARD	DI	I:23/17				N95	23	17
07-ZS-821	DRUM LID/DELID FIXTURE CRIMP JAW OPEN	DI	I:24/00				N95	24	00
07-FSL-332	INERT GAS PURGE LOW FLOW SWITCH	DI	I:24/02				N95	24	02
07-PSL-332	INERT GAS PURGE CYLINDER LOW PRESSURE	DI	I:24/01				N95	24	01
07-FEV-836B/C	ROTATION CLOCKWISE	DO	O:100/03				N95	100	03
07-FEV-836B/CC	ROTATION COUNTER-CLOCKWISE	DO	O:100/02				N95	100	02
07-FEV-837A/F	FIXTURE FORWARD	DO	O:102/00				N95	102	00
07-FEV-837A/R	FIXTURE REVERSE	DO	O:102/01				N95	102	01

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register Data File	Word	Bit	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
07-FEV-836D/E	FIXTURE SAW EXTEND	DO	O:100/06				N95	100	06
07-FEV-836D/R	FIXTURE SAW RETRACT	DO	O:100/07				N95	100	07
07-FEV-836E/V	DRUM LID LIFTER VACUUM DISABLE	DO	O:100/10				N95	100	10
07-FEV-836E/R	DRUM LID LIFTER VACUUM ENABLE	DO	O:100/11				N95	100	11
07-FEV-836A/L	FIXTURE LOWER	DO	O:100/01				N95	100	01
07-FEV-836A/R	FIXTURE RAISE	DO	O:100/00				N95	100	00
07-FEV-836F/F	CRIMPER HEAD TILT FORWARD	DO	O:100/12				N95	100	12
07-FEV-836F/B	CRIMPER HEAD TILT BACK	DO	O:100/13				N95	100	13
07-FEV-836G	FIXTURE C-CLIP MAGAZINE DRIVE ENGAGE	DO	O:100/14				N95	100	14
	FIXTURE C-CLIP MAGAZINE DRIVE DISENGAGE	DO	O:100/15					100	15
07-FEV-836C/C	CRIMPER CLOSE	DO	O:100/04				N95	100	04
07-FEV-332A	FIXTURE SAW	DO	O:46/17				N95	46	17
07-FEV-332B	INERT GAS PURGE SOLENOID	DO	O:47/00				N95	47	00
RWM BAGLESS TRANSFER PORT DO-07-305									
BAGLESS TRANSFER PORT TO PCS									
DO-07-305/CS	TRU SORTING G.B. BAGLESS TRANSFER PORT - PORT CLOSED	DI	I:027/07				N95	027	07
DO-07-305/OS	TRU SORTING G.B. BAGLESS TRANSFER PORT - PORT OPENED	DI	I:027/10				N95	027	10
PCS TO BAGLESS TRANSFER PORT									
DO-07-305/C	TRU SORTING G.B. BAGLESS TRANSFER PORT - OPEN/CLOSE P	DO	O:047/12				N95	047	12
DRUM TRANSFER CAR TC-07-301									
07-ZS-825B	TRANSFER CAR, DECELERATE AND AT RELID POSITION	DI	I:24/03				N95	24	03
07-ZS-825C	TRANSFER CAR, DECELERATE AND AT DRUM TIP/DELID POSI	DI	I:24/04				N95	24	04
07-FEV-837B/F	DRUM TRANSFER CAR FORWARD	DO	O:102/02				N95	102	02
07-FEV-837C/R	DRUM TRANSFER CAR REVERSE	DO	O:102/04				N95	102	04
07-FEV-837D	DRUM TRANSFER CAR DECELERATE	DO	O:102/06				N95	102	06
STAND ALONE INSTRUMENTS									
07-PDISL-318	LOW DIFFERENTIAL PRESSURE	DI	I:23/02				N95	23	02
12-NE-301	PACKET BAR CODE SCANNER	RS-485							
X	"SCAN PACKET PIN" MESSAGE								
X	"PACKET PIN ACCEPTED" MESSAGE								
X	"INVALID DATA" MESSAGE								

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
X	"DMS NOT RESPONDING" MESSAGE								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 1)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 2)								
12-NE-300	**BAR CODE SCANNER**	RS-485							
	PLC TO RTAP BAR CODE HANDSHAKING BIT								
	RTAP TO PLC BAR CODE HANDSHAKING BIT								
	RTAP TO PLC "END" MESSAGE RECEIVED								
	RTAP TO PLC BAR CODE COMMAND REGISTER								
END OF LCU 103 F	RTAP TO PLC TEMPORARY DRUM PIN STORAGE TABLE								
	INTERNAL DRUM PIN DATA TABLE								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 1 - FIXED)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 2)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 3)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 4)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 5)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 6)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 7)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 8 - FIXED)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 9 - FIXED)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 10)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 11)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 12)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 13 - FIXED)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 14)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 15)								
	PLC TO RTAP MESSAGE (BAR CODE DISPLAY LINE 16)								
X	"LAST BAR CODE:" MESSAGE								
X	"BAR CODE HIST:" MESSAGE								
X	"OPERATION:" MESSAGE								
X	"LOCATION: LLW EXIT GB" MESSAGE								
X	"COMMAND NOT RECOGNIZED" MESSAGE								

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
X	"READY FOR NEXT DRUM PIN" MESSAGE								
X	"DRUM PIN . . . ACCEPTED" MESSAGE								
X	"INVALID DATA" MESSAGE								
X	"PROCEDURE DONE, DATA SENT" MESSAGE								
X	"DMS NOT RESPONDING" MESSAGE								
X	"CNCL PREV READ" COMMAND								
X	"CANCEL OPERATION" COMMAND								
X	"END" COMMAND								
07-XS-311	LIGHT CURTAIN	DI	I:23/05				N95	23	05
07-XS-312A	LIGHT CURTAIN	DI	I:23/03				N95	23	03
07-XS-312B	LIGHT CURTAIN	DI	I:23/04				N95	23	04
07-XS-312C	LIGHT CURTAIN	DI					N95		
07-ZS-823A	MANIPULATOR PARKED AT POSITION 1	DI	I:22/16				N95	22	16
07-ZS-823B	MANIPULATOR PARKED AT POSITION 2	DI	I:22/17				N95	22	17
07-ZS-823C	MANIPULATOR ARM PARKED	DI	I:23/00				N95	23	00
07-ZS-823D	MANIPULATOR ARM PARKED	DI	I:23/01				N95	23	01
07-FEV-318A	PNEUMATIC VALVE MANIFOLD AIR SUPPLY	DO	O:46/16				N95	46	16
07-FEV-318B	PNEUMATIC VALVE MANIFOLD AIR SUPPLY	DO	O:46/15				N95	46	15
07-FEV-331	PNEUMATIC CONTROLLER AIR SUPPLY	DO	O:46/14				N95	46	14
07-FEV-330	BAGLESS TRANSFER PORT CONTROLLER AIR SUPPLY	DO	O:46/01				N95	46	01
07-PDA-318	LOW DIFFERENTIAL PRESSURE WARNING BEACON	DO	O:46/13				N95	46	13
OIU SCREEN INTERFACE									
MAIN									
INFORMATION		BTW	N514:00/00				N514	00	00
OPERATORS	RWM PORT MENU		I:063						
	TRANSFER CAR MENU		I:063						
	DRUM TIPPER MENU		I:063						
	LID/DELID MENU		I:063						
	SAW OPERATIONS MENU		I:063						
	PACKET X-RAY/ASSAY MENU		I:063						
	SORTING TABLE MENU		I:063						

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	SAMPLE LOADOUT MENU		I:063						
	SYSTEM INITIALIZE	BTR	N515:00/00				N515	00	00
	SYSTEM INITIALIZE PILOT LIGHT	BTW	N514:01/00				N514	01	00
STATUS									
	SYSTEM INITIALIZED	BTW	N514:02/01				N514	02	01
	SYSTEM NOT INITIALIZED	BTW	N514:02/04				N514	02	04
	SEQUENCE FAILED	BTW	N514:02/15				N514	02	15
DRUM TIPPER									
INFORMATION	TIPPER AT VERTICAL	BTW	N514:11/00				N514	11	00
OPERATORS	LOWER AND CLOSE GRAB	BTR	N515:03/00				N515	03	00
	RAISE WITH GRAB CLOSED	BTR	N515:03/01				N515	03	01
	LOWER WITH GRAB CLOSED	BTR	N515:03/02				N515	03	02
	OPEN GRAB AND PARK	BTR	N515:03/03				N515	03	03
	RAISE TIPPER	BTR	N515:03/04				N515	03	04
	LOWER TIPPER	BTR	N515:03/05				N515	03	05
	ALARMS	BTR	N515:01/04				N515	01	04
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00
	MAIN MENU		I:063						
STATUS	LOWER AND CLOSE GRAB SEQUENCE IN PROGRESS	BTW	N514:12/00				N514	12	00
	LOWER AND CLOSE GRAB SEQUENCE COMPLETE	BTW	N514:12/01				N514	12	01
	RAISE WITH GRAB CLOSED SEQUENCE IN PROGRESS	BTW	N514:12/02				N514	12	02
	RAISE WITH GRAB CLOSED SEQUENCE COMPLETE - ROTATIO	BTW	N514:12/03				N514	12	03
	LOWER WITH GRAB CLOSED SEQUENCE IN PROGRESS	BTW	N514:12/04				N514	12	04
	LOWER WITH GRAB CLOSED SEQUENCE COMPLETE	BTW	N514:12/05				N514	12	05
	OPEN GRAB AND PARK SEQUENCE IN PROGRESS	BTW	N514:12/06				N514	12	06
	OPEN GRAB AND PARK SEQUENCE COMPLETE	BTW	N514:12/07				N514	12	07
	SEQUENCE FAILED	BTW	N514:12/15				N514	12	15
PACKET X-RAY									
INFORMATION		BTW	N514:21/00				N514	21	00
OPERATORS	OPEN PACKET X-RAY	BTR	N515:06/06				N515	06	06
	CLOSE PACKET X-RAY	BTR	N515:06/07				N515	06	07

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	ENABLE PACKET X-RAY	BTR	N515:06/10				N515	06	10
	ALARMS	BTR	N515:01/04				N515	01	04
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00
	MAIN MENU		1:063						
STATUS	OPEN PACKET X-RAY SEQUENCE IN PROGRESS	BTW	N514:21/00				N514	21	00
	OPEN PACKET X-RAY SEQUENCE COMPLETE	BTW	N514:21/01				N514	21	01
	CLOSE PACKET X-RAY SEQUENCE IN PROGRESS	BTW	N514:21/02				N514	21	02
	CLOSE PACKET X-RAY SEQUENCE COMPLETE	BTW	N514:21/03				N514	21	03
	SEQUENCE FAILED	BTW	N514:21/15				N514	21	15
PACKET ASSAY MENU									
INFORMATION									
OPERATORS	OPEN PACKET ASSAY	BTR	N515:06/03				N515	06	03
	CLOSE PACKET ASSAY	BTR	N515:06/02				N515	06	02
	ENABLE PACKET ASSAY	BTR	N515:06/09				N515	06	09
	ALARMS	BTR	N515:01/04				N515	01	04
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00
	MAIN MENU		1:063						
STATUS	CLOSE PACKET ASSAY SEQUENCE IN PROGRESS	BTW	N514:21/08				N514	21	08
	CLOSE PACKET ASSAY SEQUENCE COMPLETE	BTW	N514:21/09				N514	21	09
	OPEN PACKET ASSAY SEQUENCE IN PROGRESS	BTW	N514:21/10				N514	21	10
	OPEN PACKET ASSAY SEQUENCE COMPLETE	BTW	N514:21/11				N514	21	11
	SEQUENCE FAILED	BTW	N514:21/15				N514	21	15
LID/DELID									
INFORMATION		BTW	N514:14/00				N514	14	00
OPERATORS	DELID POSITION	BTR	N515:04/00				N515	04	00
	LID POSITION	BTR	N515:04/01				N515	04	01
	START DELID SEQUENCE	BTR	N515:04/02				N515	04	02
	START RELID SEQUENCE	BTR	N515:04/03				N515	04	03
	CLIPS LOADED	BTR	N515:04/04				N515	04	04
	ALARMS	BTR	N515:01/04				N515	01	04
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	MAIN MENU		1:063						
STATUS	FIXTURE MOVING TO DELID POSITION	BTW	N514:15/00				N514	15	00
	FIXTURE MOVING TO RELID POSIITION	BTW	N514:15/01				N514	15	01
	DELID SEQUENCE IN PROGRESS	BTW	N514:15/02				N514	15	02
	DELID SEQUENCE COMPLETE	BTW	N514:15/03				N514	15	03
	RELID SEQUENCE IN PROGRESS	BTW	N514:15/04				N514	15	04
	RELID SEQUENCE COMPLETE	BTW	N514:15/05				N514	15	05
	SEQUENCE FAILED	BTW	N514:15/15				N514	15	15
	OPERATOR: LOAD CLIPS	BTW	N514:15/08				N514	15	08
SAW OPER.									
INFORMATION		BTW	N514:17/00				N514	17	00
OPERATORS	C1 AND C4 SAW ORIENTATION	BTR	N515:05/00				N515	05	00
	C2 AND C5 SAW ORIENTATION	BTR	N515:05/01				N515	05	01
	C3 AND C6 SAW ORIENTATION	BTR	N515:05/02				N515	05	02
	START SAW SEQUENCE	BTR	N515:05/03				N515	05	03
	CLAMP BAND HELD	BTR	N515:05/04				N515	05	04
	ALARMS	BTR	N515:01/04				N515	01	04
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00
	MAIN MENU		1:063						
STATUS	C2 AND C5 SAW ORIENTATION READY	BTW	N514:18/01				N514	18	01
	C3 AND C6 SAW ORIENTATION READY	BTW	N514:18/02				N514	18	02
	SAW SEQUENCE IN PROGRESS	BTW	N514:18/03				N514	18	03
	SAW SEQUENCE COMPLETE	BTW	N514:18/04				N514	18	04
	OPERATOR ACTION VIA MANIPULATOR CONTROLS REQUIRE	BTW	N514:18/05				N514	18	05
	SEQUENCE FAILED	BTW	N514:18/15				N514	18	15
RWM PORT									
INFORMATION	CURRENT WEIGHT	BTW	N514:04				N514	04	
	CURRENT SETPOINT		N514:03				N514	03	
OPERATORS	START ENTRY	BTR	N515:01/00				N515	01	00
	START EXIT	BTR	N515:01/01				N515	01	01
	OPEN PORT	BTR	N515:01/02				N515	01	02

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	CLOSE PORT	BTR	N515:01/03				N515	01	03
	ALARMS	BTR	N515:01/04				N515	01	04
	DRUM READY FOR PICKUP	BTR	N515:01/05				N515	01	05
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00
	MAIN MENU		I:063						
STATUS	ENTRY SEQUENCE IN PROGRESS	BTW	N514:06/00				N514	06	00
	ENTRY SEQUENCE COMPLETE	BTW	N514:06/01				N514	06	01
	PORT OPEN SEQUENCE IN PROGRESS	BTW	N514:06/02				N514	06	02
	PORT OPEN SEQUENCE COMPLETE - PORT OPEN	BTW	N514:06/03				N514	06	03
	PORT CLOSE SEQUENCE IN PROGRESS	BTW	N514:06/04				N514	06	04
	PORT CLOSE SEQUENCE COMPLETE - PORT CLOSED	BTW	N514:06/05				N514	06	05
	EXIT SEQUENCE IN PROGRESS	BTW	N514:06/06				N514	06	06
	EXIT SEQUENCE COMPLETE	BTW	N514:06/07				N514	06	07
	DRUM AT LIFT TABLE	BTW	N514:06/08				N514	06	08
	NO DRUM AT LIFT TABLE	BTW	N514:06/09				N514	06	09
	SEQUENCE FAILED	BTW	N514:06/15				N514	06	15
XFER CAR									
INFORMATION		BTW	N514:08/00				N514	08	00
OPERATORS	DELID/TIPPER	BTR	N515:02/00				N515	02	00
	RELID	BTR	N515:02/01				N515	02	01
	COMPACTOR GLOVEBOX	BTR	N515:02/02				N515	02	02
	EMPTY DRUM LOADOUT GLOVEBOX	BTR	N515:02/03				N515	02	03
	ENTRY GLOVEBOX	BTR	N515:02/04				N515	02	04
	ALARMS	BTR	N515:01/04				N515	01	04
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00
	MAIN MENU		I:063						
STATUS	TRANSFER CAR MOVING TO DELID POSITION	BTW	N514:09/00				N514	09	00
	TRANSFER CAR AT DELID POSITION	BTW	N514:09/01				N514	09	01
	TRANSFER CAR MOVING TO RELID POSITION	BTW	N514:09/02				N514	09	02
	TRANSFER CAR AT RELID POSITION	BTW	N514:09/03				N514	09	03
	TRANSFER CAR MOVING TO COMPACTOR POSITION	BTW	N514:09/04				N514	09	04
	TRANSFER CAR AT COMPACTOR POSITION	BTW	N514:09/05				N514	09	05
	TRANSFER CAR SEQUENCE FAILED	BTW	N514:09/06				N514	09	06
	TRANSFER CAR MOVING TO ENTRY GLOVEBOX	BTW	N514:09/07				N514	09	07
	TRANSFER CAR AT ENTRY GLOVEBOX	BTW	N514:09/08				N514	09	08
	TRANSFER CAR MOVING TO EMPTY DRUM LOADOUT	BTW	N514:09/09				N514	09	09

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	TRANSFER CAR AT EMPTY DRUM LOADOUT	BTW	N514:09/10				N514	09	10
	SEQUENCE FAILED	BTW	N514:09/15				N514	09	15
SORTING TABLE									
INFORMATION		BTW	N514:23				N514	23	
OPERATORS	TIPPER POSITION	BTR	N515:07/00				N515	07	00
	ASSAY POSITION	BTR	N515:07/01				N515	07	01
	RWM LOADOUT POSITION	BTR	N515:07/02				N515	07	02
	WASTE LOADOUT POSITION 1	BTR	N515:07/03				N515	07	03
	WASTE LOADOUT POSITION 2	BTR	N515:07/04				N515	07	04
	HOME POSITION	BTR	N515:07/05				N515	07	05
	ALARMS	BTR	N515:01/04				N515	01	04
	ALARM PILOT LIGHT	BTW	N514:05/00				N514	05	00
	MAIN MENU		I:063						
STATUS	SORTING TABLE MOVING TO TIPPER POSITION	BTW	N514:24/00				N514	24	00
	SORTING TABLE MOVING TO ASSAY POSITION	BTW	N514:24/01				N514	24	01
	SORTING TABLE MOVING TO RWM LOADOUT POSITION	BTW	N514:24/02				N514	24	02
	SORTING TABLE MOVING TO WASTE LOADOUT POSITION 1	BTW	N514:24/03				N514	24	03
	SORTING TABLE MOVING TO WASTE LOADOUT POSITION 2	BTW	N514:24/04				N514	24	04
	SORTING TABLE MOVING TO HOME POSITION	BTW	N514:24/05				N514	24	05
	SORTING TABLE AT TIPPER POSITION	BTW	N514:24/07				N514	24	07
	SORTING TABLE AT ASSAY POSITION	BTW	N514:24/08				N514	24	08
	SORTING TABLE AT RWM POSITION	BTW	N514:24/09				N514	24	09
	SORTING TABLE AT WASTE LOADOUT POSITION 1	BTW	N514:24/10				N514	24	10
	SORTING TABLE AT WASTE LOADOUT POSITION 2	BTW	N514:24/11				N514	24	11
	SORTING TABLE AT HOME POSITION	BTW	N514:24/12				N514	24	12
	SEQUENCE FAILED	BTW	N514:24/15				N514	24	15
ALARM SCREEN									
	RETURN TO CURRENT SCREEN		N515:13/00				N515	13	00
	INDIVIDUAL ACKNOWLEDGE		N515:13/01				N515	13	01
	GLOBAL ACKNOWLEDGE		N515:13/02				N515	13	02
	INDIVIDUAL ERASE		N515:13/03				N515	13	03

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	GLOBAL ERASE		N515:13/04				N515	13	04
MAINTENANCE									
	MOTOR RAISE		N515:09/00				N515	09	00
	MOTOR LOWER		N515:09/01				N515	09	01
	DRUM GRAB OPEN		N515:09/02				N515	09	02
	DRUM GRAB CLOSE		N515:09/03				N515	09	03
	GRAB ROTATE LEFT		N515:09/04				N515	09	04
	GRAB ROTATE RIGHT		N515:09/05				N515	09	05
	JOYSTICK ROTATE PERMISSIVE		N515:09/06				N515	09	06
	PACKET TRAY DOOR FORWARD		N515:09/07				N515	09	07
	PACKET TRAY DOOR REVERSE		N515:09/08				N515	09	08
	PACKET ASSAY TRAY EXTEND		N515:09/09				N515	09	09
	PACKET ASSAY TRAY RETRACT		N515:09/10				N515	09	10
	PACKET X-RAY TRAY EXTEND		N515:09/11				N515	09	11
	PACKET X-RAY TRAY RETRACT		N515:09/12				N515	09	12
	PACKET X-RAY ENABLE		N515:09/13				N515	09	13
	PACKET ASSAY ENABLE		N515:09/14				N515	09	14
	SAW FIXTURE ROTATION CLOCKWISE		N515:12/02				N515	12	02
	SAW FIXTURE ROTATION COUNTER-CLOCKWISE		N515:10/00				N515	10	00
	FIXTURE FORWARD		N515:10/01				N515	10	01
	FIXTURE REVERSE		N515:10/02				N515	10	02
	FIXTURE SAW EXTEND		N515:10/03				N515	10	03
	FIXTURE SAW RETRACT		N515:10/04				N515	10	04
	DRUM LID LIFTER VACUUM ON		N515:10/05				N515	10	05
	DRUM LID LIFTER VACUUM OFF		N515:10/06				N515	10	06
	FIXTURE RAISE		N515:10/07				N515	10	07
	FIXTURE LOWER		N515:10/08				N515	10	08
	CRIMPER HEAD TILT FORWARD		N515:10/09				N515	10	09
	CRIMPER HEAD TILT BACK		N515:10/10				N515	10	10
	FIXTURE C-CLIP DRIVE		N515:10/11				N515	10	11
	CRIMPER CLOSE		N515:10/12				N515	10	12

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	FIXTURE SAW ON		N515:10/14				N515	10	14
	INERT GAS PURGE SOLENOID		N515:12/03				N515	12	03
	BAGLESS TRANSFER PORT - CLOSE		N515:11/00				N515	11	00
	BAGLESS TRANSFER PORT - OPEN		N515:11/01				N515	11	01
	DRUM TRANSFER CAR FORWARD		N515:11/02				N515	11	02
	DRUM TRANSFER CAR REVERSE		N515:11/03				N515	11	03
	DRUM TRANSFER CAR DECELERATE		N515:11/04				N515	11	04
	PNEUMATIC VALVE MANIFOLD (A) AIR SUPPLY		N515:11/05				N515	11	05
	PNEUMATIC VALVE MANIFOLD (B) AIR SUPPLY		N515:11/06				N515	11	06
	PNEUMATIC CONROLLER AIR SUPPLY		N515:11/07				N515	11	07
	BAGLESS TRANSFER PORT CONTROLLER AIR SUPPLY		N515:11/08				N515	11	08
	LOW DIFFERENTIAL PRESSURE WARNING BEACON		N515:11/09				N515	11	09
	VACUUM ISOLATION SOLENOID		N515:12/00				N515	12	00
	TRANSFER CAR ENGAGE/DISENGAGE		N515:12/01				N515	12	01
	EXTEND SORTING TABLE		N515:11/10				N515	11	10
	RETRACT SORTING TABLE		N515:11/11				N515	11	11
	STOP SORTING TABLE		N515:11/12				N515	11	12
	HOME POSITION		N515:07/05				N515	07	05
	EXTENDED POSITION		N515:11/04				N515	11	04
	TIPPER POSITION		N515:07/00				N515	07	00
	ASSAY POSITION		N515:07/01				N515	07	01
	RWM POSITION		N515:07/02				N515	07	02
	WASTE LOADOUT #1 POSITION		N515:07/03				N515	07	03
	WASTE LOADOUT #2 POSITION		N515:07/04				N515	07	04
	REHOME LIFT TABLE LT-09-203B		N515:10/13				N515	10	13
PCS To DMS									
	TRANSMIT MESSAGE TO SUPV.								
	TRANSMIT MESSAGE 5.3.1								
5.3.1	DRUM LOCATION								
	DRUM PIN								
DMS TO PCS									

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
MISCELLANEOUS DRUM TABLES									
TRANSFER CAR DRUM TRACKING TABLE									
	DRUM PIN								
	DRUM WEIGHT								
	DRUM ROUTE								
	DRUM STATUS								
LID/DELID FIXTURE DRUM TRACKING TABLE									
	DRUM PIN								
	DRUM WEIGHT								
	DRUM ROUTE								
	DRUM STATUS								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
07-ZS-870/A	FAILED TO MOVE TO HOME POSITION			N519	00	00-01	N514	25	06
ST-07-302TS/A	FAILED TO MOVE TO TIP POSITION			N519	00	02-03	N514	25	00
ST-07-302AS/A	FAILED TO MOVE TO ASSAY POSITION			N519	00	04-05	N514	25	02
ST-07-302RWS/A	FAILED TO MOVE TO RWM LOADOUT POSITION			N519	00	06-07	N514	25	03
ST-07-302W1S/A	FAILED TO MOVE TO WASTE LOADOUT POSITION 1			N519	00	08-09	N514	25	04
ST-07-302W2S/A	FAILED TO MOVE TO WASTE LOADOUT POSITION 2			N519	00	10-11	N514	25	05
07-ZS-317/A	DRUM TIPPER CLUTCH TRIPPED			N519	00	14-15	N514	13	00
07-ZS-820A/A	DRUM GRAB FAILED TO CLOSE			N519	01	00-01	N514	13	02
07-ZS-820B/A	DRUM GRAB FAILED TO OPEN			N519	01	02-03	N514	13	03
07-ZS-328A/A	DRUM TIPPER FAILED TO RAISE			N519	01	04-05	N514	13	05
07-ZS-328B/A	DRUM TIPPER FAILED TO LOWER			N519	01	06-07	N514	13	01
07-ZS-327B/A	PACKET ASSAY FAILS TO CLOSE			N519	01	08-09	N514	22	01
07-ZS-327A/A	PACKET X-RAY FAILS TO CLOSE			N519	01	10-11	N514	22	00
07-ZS-826A/A	FIXTURE FAILED TO RAISE			N519	01	12-13	N514	16	00
07-ZS-826B/A	FIXTURE FAILED TO LOWER			N519	01	14-15	N514	16	01
07-ZS-828A/A	FIXTURE FAILED TO MOVE TO PARK/RELID POSITION			N519	02	00-01	N514	16	08
07-ZS-828B/A	FIXTURE FAILED TO MOVE TO DELID POSITION			N519	02	02-03	N514	16	02
07-ZS-824A/A	SAW FAILED TO EXTEND			N519	02	04-05	N514	19	00
07-ZS-824B/A	SAW FAILED TO RETRACT			N519	02	06-07	N514	19	01
07-ZS-819B/A	CRIMP HEAD FAILED TO MOVE FORWARD			N519	02	08-09	N514	16	03
07-ZS-819A/A	CRIMP HEAD FAILED TO MOVE BACK			N519	02	10-11	N514	16	04

LCU 103 File 51 PLC Memory Map - TRU Sorting Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
07-ZS-821O/A	CRIMP HEAD FAILED TO OPEN			N519	02	12-13	N514	16	05
07-ZS-821C/A	CRIMP HEAD FAILED TO CLOSE			N519	02	14-15	N514	16	06
07-FSL-332/A	INERT GAS PURGE LOW FLOW			N519	03	00-01	N514	19	02
07-PSL-332/A	INERT GAS PURGE CYLINDER LOW PRESSURE			N519	03	02-03	N514	19	03
07-ZS-810/A	TRANSFER CAR FAILED TO REACH ENTRY GLOVEBOX			N519	03	04-05	N514	10	01
07-ZS-825C/A	TRANSFER CAR FAILED TO REACH TIP/DELID POSITION			N519	03	06-07	N514	10	00
07-ZS-825B/A	TRANSFER CAR FAILED TO REACH RELID POSITION			N519	03	08-09	N514	10	03
07-ZS-818/A	TRANSFER CAR FAILED TO REACH COMPACTOR POSITION			N519	03	10-11	N514	10	04
07-ZS-816/A	TRANSFER CAR FAILED TO REACH EMPTY DRUM LOADOUT POSITION			N519	03	12-13	N514	10	02
07-PDISL-318/A	LOW GLOVEBOX DIFFERENTIAL PRESSURE			N519	03	14-15	N514		
	BAGLESS TRANSFER PORT FAILS TO OPEN			N519	04	00-01	N514	7	01
	BAGLESS TRANSFER PORT FAILS TO CLOSE			N519	04	02-03	N514	7	02
END OF LCU 103 FILE 51 MEMORY MAP									

LCU 103 File 52 PLC Memory Map - Empty Drum Compact Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
COMPACTION HYDRAULIC POWER UNIT/CONTROLLER HU-07-304									
PCS TO COMPACTOR									
HU-07-304/CD	COMPACT DRUM	B		N52	06	00			
HU-07-304/AB	ABORT DRUM COMPACTION	B		N52	06	01			
COMPACTOR TO PCS									
HU-07-304/RD	READY TO COMPACT	B		N52	05	01			
HU-07-304/CP*	DRUM COMPACTED	B		N52	05	04			
HU-07-304/PP*	COMPACTION IN PROGRESS	B		N52	05	02			
OIU POINTS									
PCS TO DMS									
	PREPARE TO RECEIVE PCS DATA								
	READY TO RECEIVE DMS DATA								
	DMS DATA RECEIVED								
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	CONTAINER(S) LOCATION								
	PALLET BIN LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								
5.3.22	REQUEST STATUS OF DMS SYSTEM MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.3.25	STATUS OF PCS SYSTEM MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								
	SOFTWARE ERROR CODE								
	PREPARE TO RECEIVE DMS DATA								
	READY TO RECEIVE PCS DATA								
	PCS DATA RECEIVED MESSAGE GENERAL/SPECIFIC TYPE								

LCU 103 File 52 PLC Memory Map - Empty Drum Compact Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	CONTAINER LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								
5.4.3	**PROCESSING PICK LIST ITEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	NUMBER PICK LIST ITEMS								
	CONTAINER IDENTIFICATION(S)								
	PROCESS ROUTE								
	SAMPLE?								
	COMPLIANT?								
5.4.12	**STATUS OF DMS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								
	SOFTWARE ERROR CODE								
	SOFTWARE ERROR MESSAGE								
5.4.14	**CRITICALITY ALERT MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CRITICALITY LOCATION								
	CONTAINER IDENTIFICATION								
	ALARM LEVEL								
5.4.15	**REQUEST STATUS OF PCS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.16	**CONTAINER DATABASE INFO MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.17	**FACILITY CURIE LEVEL MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CURRENT LEVEL (GRAMS)								
	ALARM EXISTING								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
	COMPACTOR TROUBLE			N529	00	00-01	N521	200	00-01

LCU 103 File 52 PLC Memory Map - Empty Drum Compact Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
END OF LCU 103 FILE 52 MEMORY MAP									

LCU 103 File 53 PLC Memory Map - Empty Drum Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
EMPTY DRUM LOADOUT BAGLESS TRANSFER PORT DO-07-308									
PCS TO BAGLESS TRANSFER PORT									
DO-07-308/C	**TRU EMPTY DRUM LOADOUT BAGLESS XFER PORT - OPEN/CLOSE**	DO	O:047/14						
BAGLESS TRANSFER PORT TO PCS									
DO-07-308/CS	**TRU EMPTY DR LOADOUT BAGLESS XFER PORT - PORT CLOSED**	DI	I:027/11						
DO-07-308/OS	**TRU EMPTY DR LOADOUT BAGLESS XFER PORT - PORT OPENED**	DI	I:027/12						
OIU SCREEN INTERFACE									
MAIN									
INFORMATION		BTW	N534:00/00				N534	00	00
OPERATORS	**EMPTY DRUM LOADOUT MENU**		I:065						
	EMPTY DRUM PORT MENU		I:065						
	COMPACTOR MENU		I:065						
	TRANSFER CAR MENU		I:065						
STATUS	**SEQUENCE FAILED**	BTW	N534:01/15				N534	01	15
EMP.DR.LDOUT									
INFORMATION	**COMPACTED DRUM WEIGHT**	BTW	N534:03				N534	03	
	CUMULATIVE WEIGHT	BTW	N534:04				N534	04	
	NUMBER OF DRUMS IN LOADOUT DRUM	BTW	N534:05				N534	05	
OPERATORS	**ADD TO CUMULATIVE**	BTR	N535:00/00				N535	00	00
	ALARMS	BTR	N535:00/02				N535	00	02
	ALARM PILOT LIGHT	BTW	N534:06/00				N534	06	00
	MAIN MENU		I:065						
STATUS	**CUMULATIVE WEIGHT EXCEEDED**	BTW	N534:07/00				N534	07	00
	SEQUENCE FAILED	BTW	N534:07/15				N534	07	15
EMP.DR.PORT									
INFORMATION	**CURRENT WEIGHT**	BTW	N534:09				N534	09	
	CURRENT SETPOINT	BTW	N534:12				N534	12	
OPERATORS	**START ENTRY SEQUENCE**	BTR	N535:01/00				N535	01	00
	MAIN MENU		I:065						
STATUS	**DRUM AT LIFT TABLE**	BTW	N534:10/00				N534	10	00
	NO DRUM AT LIFT TABLE	BTW	N534:10/01				N534	10	01
	ENTRY SEQUENCE COMPLETE	BTW	N534:10/03				N534	10	03
	EXIT SEQUENCE IN PROGRESS	BTW	N534:10/04				N534	10	04
	EXIT SEQUENCE COMPLETE	BTW	N534:10/05				N534	10	05

LCU 103 File 53 PLC Memory Map - Empty Drum Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	PORT OPEN SEQUENCE IN PROGRESS	BTW	N534:10/06				N534	10	06
	PORT OPEN SEQUENCE COMPLETE - PORT OPEN	BTW	N534:10/07				N534	10	07
	PORT CLOSE SEQUENCE IN PROGRESS	BTW	N534:10/08				N534	10	08
	PORT CLOSE SEQUENCE COMPLETE - PORT CLOSED	BTW	N534:10/09				N534	10	09
	SEQUENCE FAILED	BTW	N534:10/15				N534	10	15
COMPACTOR									
INFORMATION		BTW	N534:12/00				N534	12	00
OPERATORS	START COMPACT	BTR	N535:02/00				N535	02	00
	MAIN MENU		I:065						
STATUS	COMPACTION IN PROGRESS	BTW	N534:13/00				N534	13	00
	COMPACTION COMPLETE	BTW	N534:13/01				N534	13	01
	SEQUENCE FAILED	BTW	N534:13/15				N534	13	15
XFER CAR									
INFORMATION		BTW	N534:15/00				N534	15	00
OPERATORS	DELID/TIPPER	BTR	N535:03/00				N535	03	00
	RELID	BTR	N535:03/01				N535	03	01
	COMPACTOR GLOVEBOX	BTR	N535:03/02				N535	03	02
	EMPTY DRUM LOADOUT GLOVEBOX	BTR	N535:03/03				N535	03	03
	ENTRY GLOVEBOX	BTR	N535:03/04				N535	03	04
	ALARMS	BTR	N535:03/05				N535	03	05
	ALARM PILOT LIGHT	BTW	N534:06/00				N534	06	00
STATUS	TRANSFER CAR MOVING TO DELID/TIP POSITION	BTW	N534:16/00				N534	16	00
	TRANSFER CAR AT DELID/TIP POSITION	BTW	N534:16/01				N534	16	01
	TRANSFER CAR MOVING TO RELID POSITION	BTW	N534:16/02				N534	16	02
	TRANSFER CAR AT RELID POSITION	BTW	N534:16/03				N534	16	03
	TRANSFER CAR MOVING TO COMPACTOR GLOVEBOX	BTW	N534:16/04				N534	16	04
	TRANSFER CAR AT COMPACTOR GLOVEBOX	BTW	N534:16/05				N534	16	05
	TRANSFER CAR MOVING TO ENTRY GLOVEBOX	BTW	N534:16/06				N534	16	06
	TRANSFER CAR AT ENTRY GLOVEBOX	BTW	N534:16/07				N534	16	07
	TRANSFER CAR MOVING TO EMPTY DRUM LOADOUT GLOVEBOX	BTW	N534:16/08				N534	16	08
	TRANSFER CAR AT EMPTY DRUM LOADOUT GLOVEBOX	BTW	N534:16/09				N534	16	09

LCU 103 File 53 PLC Memory Map - Empty Drum Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	SEQUENCE FAILED	BTW	N534:16/15				N534	16	15
ALARMS SCREEN									
	RETURN TO CURRENT SCREEN PUSHBUTTON	BTR	N535:05/00				N535	05	00
	INDIVIDUAL ACKNOWLEDGE	BTR	N535:05/01				N535	05	01
	GLOBAL ACKNOWLEDGE	BTR	N535:05/02				N535	05	02
	INDIVIDUAL ERASE	BTR	N535:05/03				N535	05	03
	GLOBAL ERASE	BTR	N535:05/04				N535	05	04
MAINTENANCE									
	BAGLESS TRANSFER PORT AIR SUPPLY SOLENOID - 80 PSI	BTR	N535:04/07				N535	04	07
	TRANSFER CAR FORWARD	BTR	N535:04/04				N535	04	04
	TRANSFER CAR REVERSE	BTR	N535:04/03				N535	04	03
	TRANSFER CAR DECELERATE	BTR	N535:04/05				N535	04	05
	REHOME LIFT TABLE LT-09-203C	BTR	N535:06/13				N535	06	13
PCS TO DMS									
	TRANSMIT MESSAGE TO SUPV.								
	TRANSMIT MESSAGE 5.3.1								
	TRANSMIT MESSAGE 5.3.12								
5.3.1	DRUM LOCATION			N53	74				
	DRUM PIN			N53	75-82				
5.3.12	PUCK LOCATION			N53	30				
	PUCK DRUM PIN			N53	31-38				
	OVERPACK DRUM PIN			N53	39-46				
DMS TO PCS									
MISCELLANEOUS DRUM TABLES									
EMPTY DRUM LOADOUT POSITION DRUM TRACKING TABLE									
	DRUM PIN			N53	50-57				
	DRUM WEIGHT				58				
	DRUM ROUTE				59-60				
	DRUM STATUS				61				
HOIST DRUM TRACKING TABLE									
	DRUM PIN				62-69				

LCU 103 File 53 PLC Memory Map - Empty Drum Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	DRUM WEIGHT				70				
	DRUM ROUTE				71-72				
	DRUM STATUS				73				
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
	BAGLESS TRANSFER PORT TROUBLE			N539	00	00-01			
END OF LCU 103 F	EMPTY DRUM PORT FAILED TO OPEN			N539	00	02-03	N534	11	1
	EMPTY DRUM PORT FAILED TO CLOSE			N539	00	04-05	N534	11	2
	TRANSFER CAR FAILS TO REACH TIP/DELID POSITION			N539	00	06-07	N534	17	0
	TRANSFER CAR FAILS TO REACH RELID POSITION			N539	00	08-09	N534	17	1
	TRANSFER CAR FAILS TO REACH COMPACTOR			N539	00	10-11	N534	17	2
	TRANSFER CAR FAILS TO REACH ENTRY			N539	00	12-13	N534	17	3
	TRANSFER CAR FAILS TO REACH EMPTY DRUM LOADOUT			N539	00	14-15	N534	17	4
END OF LCU 103 FILE 53 MEMORY MAP									

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
ONE TRIP DRUM PORT DO-07-309									
07-ZSC-868A	DRUM PORT LOCKED	DI	I:25/13				N95	25	13
07-ZSC-868B	DRUM PORT LOCKED	DI	I:25/14				N95	25	14
07-ZSO-867	DRUM PORT OPEN	DI	I:25/15				N95	25	15
07-ZS-865A	SWAGING HEAD ACTIVATED	DI	I:25/16				N95	25	16
07-ZS-865B	SWAGING HEAD ACTIVATED	DI	I:25/17				N95	25	17
07-ZS-865C	SWAGING HEAD ACTIVATED	DI	I:26/00				N95	26	00
07-ZS-865D	SWAGING HEAD ACTIVATED	DI	I:26/01				N95	26	01
07-PS-860	PRESSURE SWITCH FOR VACUUM LOST	DI	I:26/02				N95	26	02
07-FEV-860B/UN	SHOT BOLT UNLOCK	DO	O:106/02						
07-FEV-860B/L*	SHOT BOLT LOCK	DO	O:106/03						
07-FEV-860C/R*	PORT RAISE	DO	O:106/05						
07-FEV-860C/L*	PORT LOWER -	DO	O:106/04						
07-FEV-860D/O	PORT TRANSLATE OPEN	DO	O:106/06						
07-FEV-860D/C*	PORT TRANSLATE CLOSE	DO	O:106/07						
07-FEV-860A	SWAGING HEADS EXTEND AND RETRACT	DO	O:106/00						
07-FEV-860E/0*	VACUUM GENERATOR AIR FLOW OPEN	DO	O:106/11						
07-FEV-860E/C*	VACUUM GENERATOR AIR FLOW CLOSED	DO	O:106/10						
07-FEV-860F/0*	07-FV-860 OPEN FOR VACUUM GENERATION/RELEASE	DO	O:106/13						
07-FEV-860F/C*	07-FV-860 CLOSED FOR VACUUM ISOLATION	DO	O:106/12						
ONE TRIP DRUM PORT DO-07-310									
07-ZSC-878A	DRUM PORT LOCKED	DI	I:26/03				N95	26	03
07-ZSC-878B	DRUM PORT LOCKED	DI	I:26/04				N95	26	04
07-ZSO-877	DRUM PORT OPEN	DI	I:26/05				N95	26	05
07-ZS-875A	SWAGING HEAD ACTIVATED	DI	I:26/06				N95	26	06
07-ZS-875B	SWAGING HEAD ACTIVATED	DI	I:26/07				N95	26	07
07-ZS-875C	SWAGING HEAD ACTIVATED	DI	I:26/10				N95	26	10
07-ZS-875D	SWAGING HEAD ACTIVATED	DI	I:26/11				N95	26	11
07-PS-870	PRESSURE SWITCH FOR VACUUM LOST	DI	I:26/12				N95	26	12
07-FEV-870D/O	PORT TRANSLATE OPEN	DO	O:110/06						
07-FEV-870D/C*	PORT TRANSLATE CLOSE	DO	O:110/07						
07-FEV-870A	SWAGING HEADS EXTEND AND RETRACT	DO	O:110/00						
07-FEV-870E/C*	VACUUM GENERATOR AIR FLOW CLOSED	DO	O:110/10						
07-FEV-870F/0*	07-FV-860 OPEN FOR VACUUM GENERATION/RELEASE	DO	O:110/13						
07-FEV-870F/C*	07-FV-860 CLOSED FOR VACUUM ISOLATION	DO	O:110/12						

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
WASTE LOADOUT CHUTE XX-07-302									
07-ZS-340A	CHUTE PARKED	DI	I:26/17				N95	26	17
07-ZS-340B	CHUTE ENGAGED	DI	I:27/00				N95	27	00
XX-07-302/D	ENGAGE CHUTE	DO	O:47/07				N95	47	07
XX-07-302/U	PARK CHUTE	DO	O:47/06				N95	47	06
WASTE LOADOUT CHUTE XX-07-303									
07-ZS-874A	CHUTE PARKED	DI	I:27/02				N95	27	02
07-ZS-874B	CHUTE ENGAGED	DI	I:27/01				N95	27	01
07-XS-309	GLOVEBOX SAFETY LIGHT CURTAIN	DI	I:26/14				N95	26	14
XX-07-303/D	ENGAGE CHUTE	DO	O:47/11				N95	47	11
XX-07-303/U	PARK CHUTE	DO	O:47/10				N95	47	10
STAND ALONE INSTRUMENTS									
07-PDISL-309	G.B. LOW DIFFERENTIAL PRESSURE	DI	I:26/13				N95	26	13
07-FEV-308	G.B. PNEUMATIC VALVE MANIFOLD AIR SUPPLY	DO	O:47/03				N95	47	03
07-FEV-309	G.B. PNEUMATIC VALVE MANIFOLD AIR SUPPLY	DO	O:47/04				N95	47	04
07-PDA-309	G.B. LOW DIFFERENTIAL PRESSURE WARNING BEACON	DO	O:47/05				N95	47	05
OIU SCREEN INTERFACE									
MAIN									
INFORMATION		BTW	N544:00/00				N544	00	00
OPERATORS	LOADOUT PORT DO-07-309 MENU		I:067						
	LOADOUT PORT DO-07-310 MENU		I:067						
	SORTING TABLE MENU		I:067						
	WASTE CHUTE MENU		I:067						
STATUS	SYSTEM INITIALIZED	BTW	N544:02/03				N544	02	03
	SYSTEM NOT INITIALIZED	BTW	N544:02/04				N544	02	04
	SEQUENCE FAILED	BTW	N544:02/15				N544	02	15
DO-07-309									
INFORMATION	CURRENT WEIGHT	BTW	N544:04				N544	04	
	CURRENT SETPOINT	BTW	N544:11				N544	11	
OPERATORS	START ENTRY SEQUENCE	BTR	N545:01/00				N545	01	00
	START EXIT SEQUENCE	BTR	N545:01/01				N545	01	01
	OPEN PORT	BTR	N545:01/02				N545	01	02
	CLOSE PORT	BTR	N545:01/03				N545	01	03
	SWAGE DRUM HEAD	BTR	N545:01/04				N545	01	04

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <---> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	GENERATE VACUUM	BTR	N545:01/05				N545	01	05
	RELEASE VACUUM	BTR	N545:01/06				N545	01	06
	ALARMS	BTR	N545:01/07				N545	01	07
	ALARM PILOT LIGHT	BTW	N544:05/00				N544	05	00
	MAIN MENU		I:067						
STATUS	DRUM ENTRY SEQUENCE IN PROGRESS	BTW	N544:06/00				N544	06	00
	DRUM ENTRY SEQUENCE COMPLETE	BTW	N544:06/01				N544	06	01
	VACUUM HELD	BTW	N544:06/02				N544	06	02
	PORT OPEN SEQUENCE IN PROGRESS	BTW	N544:06/03				N544	06	03
	PORT OPEN SEQUENCE COMPLETE - PORT OPEN	BTW	N544:06/04				N544	06	04
	PORT CLOSE SEQUENCE IN PROGRESS	BTW	N544:06/05				N544	06	05
	PORT CLOSE SEQUENCE COMPLETE - PORT CLOSED	BTW	N544:06/06				N544	06	06
	DRUM HEAD SWAGED	BTW	N544:06/07				N544	06	07
	DRUM AT LIFT TABLE	BTW	N544:06/09				N544	06	09
	NO DRUM AT LIFT TABLE	BTW	N544:06/10				N544	06	10
	DRUM EXIT SEQUENCE IN PROGRESS	BTW	N544:06/12				N544	06	12
	DRUM EXIT SEQUENCE COMPLETE	BTW	N544:06/13				N544	06	13
	SEQUENCE FAILED	BTW	N544:06/15				N544	06	15
DO-07-310									
INFORMATION	CURRENT WEIGHT	BTW	N544:08				N544	08	
	CURRENT SETPOINT	BTW	N544:13				N544	13	
OPERATORS	START ENTRY SEQUENCE	BTR	N545:02/00				N545	02	00
	START EXIT SEQUENCE	BTR	N545:02/01				N545	02	01
	OPEN PORT	BTR	N545:02/02				N545	02	02
	CLOSE PORT	BTR	N545:02/03				N545	02	03
	SWAGE DRUM HEAD	BTR	N545:02/04				N545	02	04
	GENERATE VACUUM	BTR	N545:02/05				N545	02	05
	RELEASE VACUUM	BTR	N545:02/06				N545	02	06
	ALARMS	BTR	N545:01/07				N545	01	07
	ALARM PILOT LIGHT	BTW	N544:05/00				N544	05	00
	MAIN MENU		I:067						

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
STATUS	DRUM ENTRY SEQUENCE IN PROGRESS	BTW	N544:09/00				N544	09	00
U 103 FILE 33 ME	DRUM ENTRY SEQUENCE COMPLETE	BTW	N544:09/01				N544	09	01
	VACUUM HELD	BTW	N544:09/02				N544	09	02
	PORT OPEN SEQUENCE IN PROGRESS	BTW	N544:09/03				N544	09	03
	PORT OPEN SEQUENCE COMPLETE	BTW	N544:09/04				N544	09	04
	PORT CLOSE SEQUENCE IN PROGRESS	BTW	N544:09/05				N544	09	05
	PORT CLOSE SEQUENCE COMPLETE	BTW	N544:09/06				N544	09	06
	DRUM HEAD SWAGED	BTW	N544:09/07				N544	09	07
	DRUM AT LIFT TABLE	BTW	N544:09/09				N544	09	09
	NO DRUM AT LIFT TABLE	BTW	N544:09/10				N544	09	10
	DRUM EXIT SEQUENCE IN PROGRESS	BTW	N544:09/12				N544	09	12
	DRUM EXIT SEQUENCE COMPLETE	BTW	N544:09/13				N544	09	13
	SEQUENCE FAILED	BTW	N544:09/15				N544	09	15
WASTE CHUTE									
INFORMATION		BTW	N544:14/00				N544	14	00
OPERATORS	ENGAGE CHUTE (DO-07-309)	BTR	N545:04/00				N545	04	00
	PARK CHUTE (DO-07-310)	BTR	N545:04/01				N545	04	01
	ENGAGE CHUTE (DO-07-310)	BTR	N545:04/02				N545	04	02
	PARK CHUTE (DO-07-310)	BTR	N545:04/03				N545	04	03
	ALARMS	BTR	N545:01/07				N545	01	07
	ALARM PILOT LIGHT	BTW	N544:05/00				N544	05	00
	MAIN MENU		I:067						
STATUS	PORT 309 WASTE CHUTE ENGAGED	BTW	N544:15/00				N544	15	00
	PORT 309 WASTE CHUTE PARKED	BTW	N544:15/01				N544	15	01
	PORT 310 WASTE CHUTE ENGAGED	BTW	N544:15/02				N544	15	02
	PORT 310 WASTE CHUTE PARKED	BTW	N544:15/03				N544	15	03
	SEQUENCE FAILED	BTW	N544:15/15				N544	15	15
SORT TABLE									
INFORMATION		BTW	N544:11/00				N544	11	00
OPERATORS	WASTE LOADOUT POSITION 1	BTR	N545:03/00				N545	03	00
	WASTE LOADOUT POSITION 2	BTR	N545:03/01				N545	03	01

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	ASSAY POSITION	BTR	N545:03/02				N545	03	02
	ALARMS	BTR	N545:01/07				N545	01	07
	ALARM PILOT LIGHT	BTW	N544:05/00				N544	05	00
	MIAN MENU		1:067						
STATUS	SORTING TABLE MOVING TO LOADOUT POSTION 1	BTW	N544:12/00				N544	12	00
	SORTING TABLE AT LOADOUT POSITION 1	BTW	N544:12/01				N544	12	01
	SORTING TABLE MOVING TO LOADOUT POSITION 2	BTW	N544:12/02				N544	12	02
	SORTING TABLE AT LOADOUT POSITION 2	BTW	N544:12/03				N544	12	03
	SORTING TABLE MOVING TO ASSAY POSITION	BTW	N544:12/04				N544	12	04
	SORTING TABLE AT ASSAY POSITION	BTW	N544:12/05				N544	12	05
	SEQUENCE FAILED	BTW	N544:12/15				N544	12	15
SAMPLE MENU									
INFORMATION		BTW							
OPERATORS	SAMPLE LOADOUT	BTR	N545:10/00				N545	10	00
	END SAMPLE LOADOUT	BTR	N545:10/01				N545	10	01
STATUS	SAMPLE LOADOUT IN PROGRESS	BTW	N544:17/00				N544	17	00
	SAMPLE LOADOUT COMPLETE	BTW	N544:17/01				N544	17	01
	NO PURGE PORT CANISTER PRESENT	BTW	N544:17/02				N544	17	02
ALARM SCREEN									
	RETURN TO CURRENT SCREEN		N545:08/00				N545	08	00
	INDIVIDUAL ACKNOWLEDGE		N545:08/01				N545	08	01
	GLOBAL ACKNOWLEDGE		N545:08/02				N545	08	02
	INDIVIDUAL ERASE		N545:08/03				N545	08	03
	GLOBAL ERASE		N545:08/04				N545	08	04
MAINTENANCE									
	SHOT BOLT UNLOCK (DO-07-309)		N545:06/00				N545	06	00
	SHOT BOLT LOCK		N545:06/01				N545	06	01
	PORT RAISE		N545:06/02				N545	06	02
	PORT LOWER		N545:06/03				N545	06	03
	PORT TRANSLATE OPEN		N545:06/04				N545	06	04
	PORT TRANSLATE CLOSE		N545:06/05				N545	06	05

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	SWAGING HEADS EXTEND AND RETRACT		N545:06/06				N545	06	06
	VACUUM GENERATOR AIR FLOW OPEN		N545:06/07				N545	06	07
	VACUUM GENERATOR AIR FLOW CLOSE		N545:06/08				N545	06	08
	FV-860 OPEN FOR VACUUM GENERATION/RELEASE		N545:06/09				N545	06	09
	FV-860 CLOSED FOR VACUUM ISOLATION		N545:06/10				N545	06	10
	ENGAGE CHUTE		N545:06/11				N545	06	11
	PARK CHUTE		N545:06/12				N545	06	12
	PNEUMATIC VALVE MANIFOLD AIR SUPPLY		N545:06/13				N545	06	13
	LOW DIFFERENTIAL PRESSURE WARNING BEACON		N545:06/14				N545	06	14
	SHOT BOLT UNLOCK (DO-07-310)		N545:07/01				N545	07	01
	SHOT BOLT LOCK		N545:07/00				N545	07	00
	PORT RAISE		N545:07/14				N545	07	14
	PORT LOWER		N545:07/02				N545	07	02
	PORT TRANSLATE OPEN		N545:07/03				N545	07	03
	PORT TRANSLATE CLOSE		N545:07/04				N545	07	04
	SWAGING HEADS EXTEND AND RETRACT		N545:07/05				N545	07	05
	VACUUM GENERATOR AIR FLOW OPEN		N545:07/06				N545	07	06
	VACUUM GENERATOR AIR FLOW CLOSE		N545:07/07				N545	07	07
	FV-860 OPEN FOR VACUUM GENERATION/RELEASE		N545:07/08				N545	07	08
	FV-860 CLOSED FOR VACUUM ISOLATION		N545:07/09				N545	07	09
	ENGAGE CHUTE		N545:07/10				N545	07	10
	PARK CHUTE		N545:07/11				N545	07	11
	PNEUMATIC VALVE MANIFOLD AIR SUPPLY		N545:07/12				N545	07	12
	LOW DIFFERENTIAL PRESSURE WARNING BEACON		N545:07/13				N545	07	13
	REHOME LIFT TABLE LT-09-202D		N545:10/02				N545	10	02
	REHOME LIFT TABLE LT-09-202E		N545:10/03				N545	10	03
PCS T0 DMS									
	PREPARE TO RECEIVE PCS DATA								
	READY TO RECEIVE DMS DATA								
	DMS DATA RECEIVED								
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM							

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	CONTAINER(S) LOCATION								
	PALLET BIN LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								
5.3.22	**REQUEST STATUS OF DMS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.3.25	**STATUS OF PCS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								
	SOFTWARE ERROR CODE								
	SOFTWARE ERROR MESSAGE								
5.3.26	**REQUEST CONTAINER INFORMATION MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CONTAINER ID								
DMS TO PCS									
	PREPARE TO RECEIVE DMS DATA								
	READY TO RECEIVE PCS DATA								
	PCS DATA RECEIVED								
5.4.1	**WASTE CONTAINER LOCATION UPDATE (DRUMS ACCEPTED**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CONTAINER LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								
5.4.3	**PROCESSING PICK LIST ITEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	NUMBER PICK LIST ITEMS								
	CONTAINER IDENTIFICATION(S)								

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	PROCESS ROUTE								
	SAMPLE?								
	COMPLIANT?								
5.4.12	**STATUS OF DMS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								
	SOFTWARE ERROR CODE								
	SOFTWARE ERROR MESSAGE								
5.4.14	**CRITICALITY ALERT MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CRITICALITY LOCATION								
	CONTAINER IDENTIFICATION								
	ALARM LEVEL								
5.4.15	**REQUEST STATUS OF PCS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.16	**CONTAINER DATABASE INFO MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.17	**FACILITY CURIE LEVEL MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CURRENT LEVEL (GRAMS)								
	ALARM EXISTING								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
07-ZSC-869L/A	**FAILED TO LOCK - PORT 309**			N549	00	00-01	N544	07	04
07-ZSC-869U/A	**FAILED TO UNLOCK - PORT 309**			N549	00	02-03	N544	07	00
07-ZSO-870O/A	**FAILED TO OPEN - PORT 309**			N549	00	04-05	N544	07	03
07-ZSO-870C/A	**FAILED TO CLOSE - PORT 309**			N549	00	06-07	N544	07	06
07-ZSC-868/A	**DO-07-309 LOCK NOT VERIFIED**			N549	00	08-09	N544	07	05
07-ZSO-867/A	**DO-07-309 OPEN NOT VERIFIED**			N549	00	10-11	N544	07	01
07-PS-860/A	**VACUUM LOST - PORT 309**			N549	00	12-13	N544	07	02
07-PDISL-308/A	**LOW GLOVEBOX DIFFERENTIAL PRESSURE - PORT 309**			N549	00	14-15	N544	07	

LCU 103 File 54 PLC Memory Map - Waste Loadout Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <---> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
07-ZSC-878L/A	FAILED TO LOCK - PORT 310			N549	01	00-01	N544	10	04
07-ZSC-878U/A	FAILED TO UNLOCK - PORT 310			N549	01	02-03	N544	10	00
07-ZSO-877O/A	FAILED TO OPEN - PORT 310			N549	01	04-05	N544	10	03
07-ZSO-877C/A	FAILED TO CLOSE - PORT 310			N549	01	06-07	N544	10	06
07-ZSC-878/A	DO-07-310 LOCK NOT VERIFIED			N549	01	08-09	N544	10	05
07-ZSO-877/A	DO-07-310 OPEN NOT VERIFIED			N549	01	10-11	N544	10	01
07-PS-870/A	VACUUM LOST - PORT 310			N549	01	12-13	N544	10	02
07-XS-309/A	GLOVEBOX SAFETY LIGHT CURTAIN TRIPPED			N549	02	00-01			
	PORT 309 DRUM HEAD SWAGE FAILED			N549	02	02-03	N544	02	02
	PORT 310 DRUM HEAD SWAGE FAILED			N549	02	04-05	N544	10	07
	SORTING TABLE FAILS TO REACH WASTE LOADOUT #1			N549	02	06-07	N544	13	00
	SORTING TABLE FAILS TO REACH WASTE LOADOUT #2			N549	02	08-09	N544	13	01
	SORTING TABLE FAILS TO REACH ASSAY POSITION			N549	02	10-11	N544	13	02
	WASTE CHUTE FAILS TO ENGAGE			N549	02	12-13	N544	16	00
END OF LCU 103 FILE 54 MEMORY MAP									

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
HARDWIRED TO/FROM PCS									
BAGLESS TRANSFER DRUM ENTRY PORT DO-07-401									
PCS TO BAGLESS TRANSFER PORT									
DO-07-401/CS	**TRU RWM BAGLESS TRANSFER PORT - PORT CLOSED**	DI	I:027/13						
DO-07-401/OS	**TRU RWM BAGLESS TRANSFER PORT - PORT OPENED**	DI	I:027/14						
BAGLESS TRANSFER PORT TO PCS									
DO-07-401/C	**TRU RWM BAGLESS TRANSFER PORT - OPEN/CLOSE PORT**	DO	O:047/16						
ONE TRIP DRUM PORT DO-07-402A (COMPLIANT LOADOUT)									
07-ZSC-952A	**ONE TRIP DRUM PORT LOCKED**	DI	I:24/06				N95	24	06
07-ZSC-952B	**ONE TRIP DRUM PORT LOCKED**	DI	I:24/12				N95	24	12
07-ZSO-968	**ONE TRIP DRUM PORT OPEN**	DI	I:24/11				N95	24	11
07-ZS-967	**(DELETED)**	DI					N95		
07-ZS-966A	**ONE TRIP DRUM SWAGING HEAD ACTIVATED**	DI	I:24/13				N95	24	13
07-ZS-966B	**ONE TRIP DRUM SWAGING HEAD ACTIVATED**	DI	I:24/14				N95	24	14
07-ZS-966C	**ONE TRIP DRUM SWAGING HEAD ACTIVATED**	DI	I:24/07				N95	24	07
07-ZS-966D	**ONE TRIP DRUM SWAGING HEAD ACTIVATED**	DI	I:25/00				N95	25	00
07-PS-960A	**PRESSURE SWITCH FOR VACUUM LOST**	DI	I:24/15				N95	24	15
07-FEV-960I/UN*	**SHOT BOLT UNLOCK**	DO	O:113/00				N95	113	00
07-FEV-960I/L*	**SHOT BOLT LOCK**	DO	O:113/01				N95	113	01
07-FEV-960J/R*	**PORT RAISE**	DO	O:113/03				N95	113	03
07-FEV-960J/L*	**PORT LOWER**	DO	O:113/02				N95	113	02
07-FEV-960K/O*	**TRANSLATE OPEN**	DO	O:113/04				N95	113	04
07-FEV-960K/C*	**TRANSLATE CLOSE**	DO	O:113/05				N95	113	05
07-FEV-960H*	**SWAGING HEADS EXTEND AND RETRACT**	DO	O:112/16				N95	112	16
07-FEV-960L/O*	**VACUUM GENERATOR AIR FLOW OPEN**	DO	O:114/01				N95	114	01
07-FEV-960L/C*	**VACUUM GENERATOR AIR FLOW CLOSED**	DO	O:114/04				N95	114	04
07-FEV-960M/O*	**07-FV-960A OPEN FOR VACUUM GENERATION/RELEASE**	DO	O:114/03				N95	114	03
07-FEV-960M/C	**07-FV-960A CLOSED FOR VACUUM ISOLATION**	DO	O:114/02				N95	114	02
07-ZS-951A	**ONE TRIP DRUM SWAGING HEAD ACTIVATED**	DI	I:25/01				N95	25	01
07-ZS-951B	**ONE TRIP DRUM SWAGING HEAD ACTIVATED**	DI	I:27/03				N95	27	03
07-ZS-951C	**ONE TRIP DRUM SWAGING HEAD ACTIVATED**	DI	I:24/17				N95	24	17

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
07-ZS-951D	ONE TRIP DRUM SWAGING HEAD ACTIVATED	DI	I:25/00				N95	25	00
07-PS-960B	PRESSURE SWITCH FOR VACUUM LOST	DI	I:25/02				N95	25	02
07-FEV-960E/UN	SHOT BOLT UNLOCK	DO	O:112/10				N95	112	10
07-FEV-960E/L*	SHOT BOLT LOCK	DO	O:112/11				N95	112	11
07-FEV-960F/R*	PORT RAISE	DO	O:112/13				N95	112	13
07-FEV-960F/L*	PORT LOWER	DO	O:112/12				N95	112	12
07-FEV-960G/O*	TRANSLATE OPEN	DO	O:112/14				N95	112	14
07-FEV-960G/C*	TRANSLATE CLOSE	DO	O:112/15				N95	112	15
07-FEV-960D*	SWAGING HEADS EXTEND AND RETRACT	DO	O:112/06				N95	112	06
07-FEV-960N/O*	VACUUM GENERATOR AIR FLOW OPEN	DO	O:114/05				N95	114	05
07-FEV-960N/C*	VACUUM GENERATOR AIR FLOW CLOSED	DO	O:114/04				N95	114	04
07-FEV-960O/O*	07-FV-960B OPEN FOR VACUUM GENERATION/RELEASE	DO	O:114/07				N95	114	07
07-FEV-960O/C	07-FV-960B CLOSED FOR VACUUM ISOLATION	DO	O:114/06				N95	114	06
OIU SCREEN INTERFACE									
MAIN									
INFORMATION		BTW	N584:00/00				N584	00	00
OPERATORS	PORT DO-07-401 MENU		I:071						
	PORT DO-07-402A MENU		I:071						
	PORT DO-07-402B MENU		I:071						
	SAMPLE MENU		I:071						
	TREATED ITEM MENU		I:071						
	TRANSFER STAND MENU		I:071						
	INITIAL DIAGNOSTICS MENU		I:071						
	MAINTENANCE ACCESS MENU		I:071						
STATUS	SEQUENCE FAILED	BTW	N584:01/15				N584	01	15
PORT DO-07-401									
INFORMATION	LIFT TABLE WEIGHT	BTW	N584:49				N584	49	
	LIFT TABLE WEIGHT SETPOINT	BTW	N584:50				N584	50	
OPERATORS	OPEN PORT	BTR	N585:09/00				N585	09	00
	CLOSE PORT	BTR	N585:09/01				N585	09	01
	ALARMS	BTR	N585:00/05				N585	00	05
	MAIN MENU	N/A	I:071						
STATUS	DRUM AT LIFT TABLE	BTW	N584:48/00				N584	48	00
	NO DRUM AT LIFT TABLE	BTW	N584:48/01				N584	48	01
	PORT OPENING	BTW	N584:48/02				N584	48	02

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	PORT OPEN	BTW	N584:48/03				N584	48	03
	PORT CLOSING	BTW	N584:48/04				N584	48	04
	PORT CLOSED	BTW	N584:48/05				N584	48	05
	SEQUENCE FAILED	BTW	N584:48/06				N584	48	06
PORT DO-07-402A									
INFORMATION	CURRENT WEIGHT	BTW	N584:04				N584	04	
	CURRENT SETPOINT	BTW	N584:24				N584	24	
OPERATORS	OPEN PORT	BTR	N585:00/00				N585	00	00
	CLOSE PORT	BTR	N585:00/01				N585	00	01
	SWAGE DRUM HEAD	BTR	N585:00/02				N585	00	02
	GENERATE VACUUM	BTR	N585:00/03				N585	00	03
	RELEASE VACUUM	BTR	N585:00/04				N585	00	04
	ALARMS	BTR	N585:00/05				N585	00	05
	ALARM PILOT LIGHT	BTW	N584:05/00				N584	05	00
	MAIN MENU		I:071						
STATUS	PORT OPEN SEQUENCE IN PROGRESS	BTW	N584:06/01				N584	06	01
	PORT OPEN SEQUENCE COMPLETE	BTW	N584:06/02				N584	06	02
	VACUUM HELD	BTW	N584:06/03				N584	06	03
	PORT CLOSE SEQUENCE IN PROGRESS	BTW	N584:06/04				N584	06	04
	PORT CLOSE SEQUENCE COMPLETE	BTW	N584:06/05				N584	06	05
	DRUM HEAD SWAGED	BTW	N584:06/06				N584	06	06
	NO DRUM AT LIFT TABLE	BTW	N584:06/09				N584	06	09
	DRUM AT LIFT TABLE	BTW	N584:06/10				N584	06	10
	SEQUENCE FAILED	BTW	N584:06/11				N584	06	11
PORT DO-07-402B									
INFORMATION	CURRENT WEIGHT	BTW	N584:09				N584	09	
	CURRENT SETPOINT	BTW	N584:25				N584	25	
OPERATORS	OPEN PORT	BTR	N585:01/00				N585	01	00
	CLOSE PORT	BTR	N585:01/01				N585	01	01
	SWAGE DRUM HEAD	BTR	N585:01/02				N585	01	02
	GENERATE VACUUM	BTR	N585:01/03				N585	01	03
	RELEASE VACUUM	BTR	N585:01/04				N585	01	04
	ALARMS	BTR	N585:00/05				N585	00	05
	WEIGHT SETPOINT	BTR	N585:08				N585	08	
	ALARM PILOT LIGHT	BTW	N584:05/00				N584	05	00
U 103 FILE 33 ME	MAIN MENU		I:071						
STATUS	PORT OPEN SEQUENCE IN PROGRESS	BTW	N584:10/01				N584	10	01
	PORT OPEN SEQUENCE COMPLETE	BTW	N584:10/02				N584	10	02
	VACUUM HELD	BTW	N584:10/03				N584	10	03
	PORT CLOSE SEQUENCE IN PROGRESS	BTW	N584:10/04				N584	10	04

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	PORT CLOSE SEQUENCE COMPLETE	BTW	N584:10/05				N584	10	05
	DRUM HEAD SWAGED	BTW	N584:10/06				N584	10	06
	NO DRUM AT LIFT TABLE	BTW	N584:10/09				N584	10	09
	DRUM AT LIFT TABLE	BTW	N584:10/10				N584	10	10
	SEQUENCE FAILED	BTW	N584:10/11				N584	10	11
SAMPLE									
INFORMATION	N/A	BTW	N584:12/00				N584	12	00
OPERATORS	SAMPLE LOADOUT	BTR	N585:02/00				N585	02	00
	END SAMPLE LOADOUT	BTR	N585:02/01				N585	02	01
	ALARMS	BTR	N585:00/05				N585	00	05
	ALARM PILOT LIGHT	BTW	N584:05/00				N584	05	00
	MAIN MENU		I:071						
STATUS	SAMPLE LOADOUT IN PROGRESS	BTW	N584:13/00				N584	13	00
	SAMPLE LOADOUT COMPLETE	BTW	N584:13/01				N584	13	01
	NO PURGE PORT CANISTER PRESENT	BTW	N584:13/02				N584	13	02
	PURGE PORT CANISTER PRESENT	BTW	N584:13/03				N584	13	03
	SEQUENCE FAILED	BTW	N584:13/15				N584	13	15
TREATED ITEM									
INFORMATION	N/A	BTW	N584:15/00				N584	15	00
OPERATORS	TREATED ITEM LOADOUT	BTR	N585:03/00				N585	03	00
	END TREATED ITEM LOADOUT	BTR	N585:03/02				N585	03	02
	ALARMS	BTR	N585:00/05				N585	00	05
	ALARM PILOT LIGHT	BTW	N584:05/00				N584	05	00
	MAIN MENU		I:071						
STATUS	TREATED ITEM LOADOUT IN PROGRESS	BTW	N584:16/00				N584	16	00
	TREATED ITEM LOADOUT COMPLETE	BTW	N584:16/01				N584	16	01
XFER STAND									
INFORMATION	1ST BAR CODE SCAN	BTW	N584:30-37				N584	30-37	
	2ND BAR CODE SCAN	BTW	N584:38-45				N584	38-45	
OPERATORS	REMOVE ITEMS FROM TRANSFER STAND	BTR	N585:04/00				N585	04	00
	END REMOVE	BTR	N585:04/01				N585	04	01

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	ADD ITEMS TO TRANSFER STAND	BTR	N585:04/02				N585	04	02
	END ADD	BTR	N585:04/03				N585	04	03
	BAR CODE ERROR RESET	BTR	N585:04/04						
	BAR CODE ERROR RESET PILOT LIGHT	BTW	N584:51/00						
	ALARMS	BTR	N585:00/05				N585	00	05
	ALARM PILOT LIGHT	BTW	N584:05/00				N584	05	00
STATUS	REMOVAL OF ITEMS IN PROGRESS	BTW	N584:21/02				N584	21	02
	REMOVAL OF ITEMS COMPLETE	BTW	N584:21/03				N584	21	03
	ADD ITEMS IN PROGRESS	BTW	N584:21/04				N584	21	04
	ADD ITEMS COMPLETE	BTW	N584:21/05				N584	21	05
	SEQUENCE FAILED	BTW	N584:21/10				N584	21	10
ALARM SCREEN									
	RETURN TO CURRENT SCREEN	BTR	N585:07/00				N585	07	00
	INDIVIDUAL ACKNOWLEDGE	BTR	N585:07/01				N585	07	01
	GLOBAL ACKNOWLEDGE	BTR	N585:07/02				N585	07	02
	INDIVIDUAL ERASE	BTR	N585:07/03				N585	07	03
	GLOBAL ERASE	BTR	N585:07/04				N585	07	04
MAINTENANCE									
	SHOT BOLT UNLOCK (PORT DO-07-402A)		N585:05/00				N585	05	00
	SHOT BOLT LOCK		N585:05/01				N585	05	01
	PORT RAISE		N585:05/02				N585	05	02
	PORT LOWER		N585:05/03				N585	05	03
	TRANSLATE OPEN		N585:05/04				N585	05	04
	TRANSLATE CLOSE		N585:05/05				N585	05	05
	SWAGING HEADS EXTEND AND RETRACT		N585:05/06				N585	05	06
	VACUUM GENERATOR AIR FLOW OPEN		N585:05/07				N585	05	07
	VACUUM GENERATOR AIRFLOW CLOSED		N585:05/08				N585	05	08
	FV-960A OPEN FOR VACUUM GENERATION/RELEASE		N585:05/09				N585	05	09
	FV-960A CLOSED FOR VACUUM ISOLATION		N585:05/10				N585	05	10
	SHOT BOLT UNLOCK (PORT DO-07-402B)		N585:05/11				N585	05	11
	SHOT BOLT LOCK		N585:05/12				N585	05	12

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	PORT RAISE		N585:05/13				N585	05	13
	PORT LOWER		N585:05/14				N585	05	14
	TRANSLATE OPEN		N585:06/07				N585	06	07
	TRANSLATE CLOSE		N585:06/00				N585	06	00
	SWAGING HEADS EXTEND AND RETRACT		N585:06/01				N585	06	01
	VACUUM GENERATOR AIR FLOW OPEN		N585:06/02				N585	06	02
	VACUUM GENERATOR AIRFLOW CLOSED		N585:06/03				N585	06	03
	FV-960A OPEN FOR VACUUM GENERATION/RELEASE		N585:06/04				N585	06	04
	FV-960A CLOSED FOR VACUUM ISOLATION		N585:06/05				N585	06	05
	80 PSI AIR SUPPLY		N585:06/06				N585	06	06
	REHOME LIFT TABLE LT-09-201A		N585:09/02				N585	09	02
	REHOME LIFT TABLE LT-09-201B		N585:09/03				N585	09	03
	REHOME LIFT TABLE LT-09-201C		N585:09/04				N585	09	04
PCS TO DMS									
	PREPARE TO RECEIVE PCS DATA								
	READY TO RECEIVE DMS DATA								
	DMS DATA RECEIVED								
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	CONTAINER(S) LOCATION								
	PALLET BIN LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								
5.3.22	REQUEST STATUS OF DMS SYSTEM MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.3.25	STATUS OF PCS SYSTEM MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	SOFTWARE ERROR CODE								
	SOFTWARE ERROR MESSAGE								
5.3.26	**REQUEST CONTAINER INFORMATION MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CONTAINER ID								
DMS TO PCS									
	PREPARE TO RECEIVE DMS DATA								
	READY TO RECEIVE PCS DATA								
	PCS DATA RECEIVED								
5.4.1	**WASTE CONTAINER LOCATION UPDATE (DRUMS ACCEPTED) MESS**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CONTAINER LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								
5.4.3	**PROCESSING PICK LIST ITEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	NUMBER PICK LIST ITEMS								
	CONTAINER IDENTIFICATION(S)								
	PROCESS ROUTE								
	SAMPLE?								
	COMPLIANT?								
5.4.12	**STATUS OF DMS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								
	SOFTWARE ERROR CODE								
	SOFTWARE ERROR MESSAGE								
5.4.14	**CRITICALITY ALERT MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CRITICALITY LOCATION								
	CONTAINER IDENTIFICATION								

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	ALARM LEVEL								
5.4.15	REQUEST STATUS OF PCS SYSTEM MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.16	CONTAINER DATABASE INFO MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.17	FACILITY CURIE LEVEL MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CURRENT LEVEL (GRAMS)								
	ALARM EXISTING								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
07-ZSC-952A/B	FAILED TO LOCK - PORT 402A			N569	00	00-01	N584	07	01
07-ZSC-952A/B	FAILED TO UNLOCK - PORT 402A			N569	00	02-03	N584	07	00
07-ZSO-968O/A	FAILED TO OPEN - PORT 402A			N569	00	04-05	N584	07	04
07-ZSO-968C/A	PORT 402A FAILED TO CLOSE AND LOCK			N569	00	06-07	N584	07	06
07-ZSC-952/A	PORT 402A PORT LOCK NOT VERIFIED			N569	00	08-09	N584	07	02
07-ZSO-968/A	PORT 402A PORT OPENED NOT VERIFIED			N569	00	10-11	N584	07	03
07-PS-960/A	VACUUM LOST - PORT 402A			N569	00	12-13	N584	07	05
07-ZSC-969L/A	FAILED TO LOCK - PORT 402B			N569	00	14-15	N584	11	01
07-ZSC-969U/A	FAILED TO UNLOCK - PORT 402B			N569	01	00-01	N584	11	00
07-ZSO-950O/A	FAILED TO OPEN - PORT 402B			N569	01	02-03	N584	11	04
07-ZSO-950C/A	PORT 402B FAILED TO CLOSE AND LOCK			N569	01	04-05	N584	11	06
07-ZSC-969/A	PORT 402B PORT LOCK NOT VERIFIED			N569	01	06-07	N584	11	02
07-ZSO-950/A	PORT 402B PORT OPENED NOT VERIFIED			N569	01	08-09	N584	11	03
07-PS-950/A	VACUUM LOST - PORT 402B			N569	01	10-11	N584	11	05
	PORT 402A FAILED TO RAISE			N569	01	12-13	N584	11	13
	PORT 402A FAILED TO LOWER			N569	01	14-15	N584	11	14
	PORT 402B FAILED TO RAISE			N569	02	00-01	N584	08	06
	PORT 402B FAILED TO LOWER			N569	02	02-03	N584	08	07
	PORT 402A DRUM HEAD SWAGE FAILED			N569	02	06-07	N584	07	07
	PORT 402B DRUM HEAD SWAGE FAILED			N569	02	08-09	N584	11	07
END OF LCU 103 FILE 56 MEMORY MAP									

LCU 103 File 56 PLC Memory Map - TRU RWM Glovebox

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit

LCU 103 File 57 PLC Memory Map - TRU Supervisory Control Submodule

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
AGV DRUM DATA TABLES									
PROCESS AGV									
	ROLLER DECK #1 - PIN			N578	0-7				
	ROLLER DECK #1 - WEIGHT			N578	8				
	ROLLER DECK #1 - ROUTE			N578	9-10				
	ROLLER DECK #1 - SAMPLE/COMPLIANT			N578	11				
	ROLLER DECK #2 - PIN			N578	20-27				
	ROLLER DECK #2 - WEIGHT			N578	28				
	ROLLER DECK #2 - ROUTE			N578	29-30				
	ROLLER DECK #2 - SAMPLE/COMPLIANT			N578	31				
PLC TO PCS									
	MODULE-TO-SUPV. TRANSMIT (T1) HANDSHAKING BIT			N57	0	0			
	MODULE-TO-SUPV. RECEIVE (T2) HANDSHAKING BIT			N57	0	1			
	MESSAGE SENT TO SUPV.			B3		3			
	PLC-TO-PCS MESSAGE BUFFER			N575	0-1000		N475		
	TRANSMIT MESSAGE INDEX # REGISTER			N575	0		N475	0	
	PCS-TO-PLC MESSAGE ERROR			N571	21	3	N461	21	1
PCS TO PLC									
	PCS-TO-PLC RECEIVE (CTS) HANDSHAKING BIT			N570	20	0	N460	20	0
	PCS-TO-PLC MESSAGE BUFFER			N576	0-1000		N476		
	RECEIVE MESSAGE INDEX # REGISTER			N576	0				
	PCS MESSAGE RECEIVED BY MODULE			B3		2			
	FIXED BAR CODE MESSAGE RECEIVED			N57	1	0			
5.4.1	CONTAINER LOCATION UPDATE MESSAGE RECEIVED			N57	1	1			
	PAM MESSAGE RECEIVE			N57	1	2			
MISCELLANEOUS									
	"LAST BAR CODE:" MESSAGE			N90	300-306				
	"BAR CODE HIST:" MESSAGE			N90	308-315				
	"OPERATION:" MESSAGE			N90	317-321				
	"LOCATION UPDATE" OPERATION			N90	100-107				
	"LOCATION: " MESSAGE			N90	323-326				

LCU 103 File 57 PLC Memory Map - TRU Supervisory Control Submodule

Tag Name	Description	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	"BOXNDA" LOCATION			N90	9-11				
	"COMMAND NOT RECOGNIZED" MESSAGE			N90	328-338				
	"READY FOR NEXT DRUM PIN" MESSAGE			N90	340-351				
	"DRUM PIN ACCEPTED" MESSAGE			N90	416-424				
	"INVALID DATA" MESSAGE			N90	353-358				
	"PROCEDURE DONE, DATA SENT" MESSAGE			N90	360-372				
	"DRUMS ACCEPTED" MESSAGE			N90	374-380				
	"FACILITY CURIE LEVEL EXCEEDED" MESSAGE			N90	382-396				
	"DMS NOT RESPONDING" MESSAGE			N90	398-406				
END OF LCU 103 FILE 57 MEMORY MAP									

Appendix E
Local Control Unit 104
Memory Maps

Appendix E
Local Control Unit 104
Memory Maps

Table of Contents

LCU 104 File 12 PLC Memory Map - AS/RS

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
PLC I/O									
	PORTABLE BAR CODE SCANNER								
	PLC TO PCS DISCONNECT BAR CODE LINK						N211	476	0
	PCS TO PLC BAR CODE (BRCTS) HANDSHAKING BIT						N110	476	0
	PCS TO PLC BAR CODE (BRCTS2) HANDSHAKING BIT						N110	476	1
	PCS TO PLC BAR CODE LINK ESTABLISHED						N210	476	2
	PCS TO PLC BAR CODE COMMAND REGISTER						N120	0-15	
	INTERNAL DRUM PIN DATA TABLE			N128	8-39				
	PLC TO PCS BAR CODE TERMINAL ID						N121	218	
	PLC TO PCS BAR CODE MESSAGE LENGTH						N121	219	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 1)						N121	220-235	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 2)						N121	236-251	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 3)						N121	252-267	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 4)						N121	268-283	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 5)						N121	284-299	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 6)						N121	300-315	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 7)						N121	316-331	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 8)						N121	332-347	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 9)						N121	348-363	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 10)						N121	364-379	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 11)						N121	380-395	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 12)						N121	396-411	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 13)						N121	412-427	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 14)						N121	428-443	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 15)						N121	444-459	
	PLC TO PCS MESSAGE (BAR CODE DISPLAY LINE 16)						N121	460-475	
	BAR CODE MESSAGE RECEIVED			N12	5	10			
	BAR CODE IS A CONTAINER PIN			N12	5	11			
	"CNCL PREV READ" COMMAND RECEIVED			N12	5	12			
	"END" COMMAND RECEIVED			N12	5	13			
	"CANCEL OPERATION" COMMAND RECEIVED			N12	5	14			
	"RTV DRMPS" COMMAND RECEIVED			N12	5	0			
	"RTV DRMTC" COMMAND RECEIVED			N12	5	1			

LCU 104 File 12 PLC Memory Map - AS/RS

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	"RTV DRMTC1" COMMAND RECEIVED			N12	5	2			
	"RTV DRMTC2" COMMAND RECEIVED			N12	5	3			
	"RTV DRMTC3" COMMAND RECEIVED			N12	5	4			
	"STR DRMPS" COMMAND RECEIVED			N12	5	5			
	"STR DRMTC" COMMAND RECEIVED			N12	5	6			
	PALLET STAND-TO-INFEED CONV A DRUM PIN TABLE			N128	50-241				
	PALLET STAND DRUM PIN TABLE			N128	250-313				
	TRANSFER CAR DRUM PIN TABLE			N128	320-383				
	PLC_TO_RTAP DRUM PIN COMPARE REGISTER						N121	100-107	
	RTAP_TO_PLC DRUM PIN COMPARE RESULT						N120	100	
	PLC_TO_RTAP PROCESSING PICK LIST ERROR						N121	21	3
	PLC_TO_RTAP PALLET STAND STORE DRUM PIN MISMATCH						N121	21	2
	PLC_TO_RTAP PALLET STAND STORE DRUM PIN MISMATCH ACK						N120	21	2
PLC TO AS/RS									
5.7.1	**PLC TO PCS "REQUEST AS/RS SYSTEM STATUS" MESSAGE**	ETCOM		N12	2	0			
5.7.2	**PLC TO PCS DISPLAY "PALLET STAND DRUMS REQ. ID" AT PALLET STAN**	ETCOM		N12	2	1			
5.7.3	**PLC TO PCS DISPLAY "ONLY XX ID'S ENTERED, CONFIRM" AT PALLET ST**	ETCOM		N12	2	2			
	NUMBER OF DRUM ID'S			C5	2	ACC			
5.7.4	**PLC TO PCS DISPLAY "TOO MANY ID'S ENTERED" AT PALLET STAND**	ETCOM		N12	2	3			
	NUMBER OF DRUM ID'S			C5	2	ACC			
5.7.5	**PLC TO PCS "ID OF DRUMS TO STORE AT PALLET STAND" MESSAGE**	ETCOM		N12	2	4			
	NUMBER OF DRUM ID'S			C5	2	ACC			
	DRUM IDENTIFICATION			N128	8-39				
5.7.6	**PLC TO PCS "ID OF DRUM TO RETRIEVE TO PALLET STAND" MESSAGE**	ETCOM		N12	2	5			
	DRUM IDENTIFICATIONS			N128	8-15				
5.7.7	**PLC TO PCS DISPLAY "TRANSFER CAR DRUMS REQ. ID" AT XFER CAR**	ETCOM		N12	2	6			
5.7.8	**PLC TO PCS DISPLAY "ONLY XX ID'S ENTERED, CONFIRM" AT XFER CAR**	ETCOM		N12	2	7			
	NUMBER OF DRUM ID'S			C5	2	ACC			
5.7.9	**PLC TO PCS DISPLAY "TOO MANY ID'S ENTERED" AT XFER CAR**	ETCOM		N12	2	8			
	NUMBER OF DRUM ID'S			C5	2	ACC			
5.7.10	**PLC TO PCS "ID OF DRUM TO RETRIEVE TO TRANSFER CAR" MESSAGE**	ETCOM		N12	2	9			
	DRUM IDENTIFICATIONS			N128	8-15				
5.7.11	**PCL TO PCS "ID OF DRUM TO STORE TO TRANSFER CAR" MESSAGE**	ETCOM		N12	2	10			

LCU 104 File 12 PLC Memory Map - AS/RS

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	NUMBER OF DRUM ID'S			C5	2	ACC			
	DRUM IDENTIFICATION			N128	8-39				
5.7.12	**PLC TO PCS DISPLAY "LLW TO OFFSITE STORAGE" AT XFER CAR**	ETCOM		N12	2	11			
5.7.13	**PLC TO PCS DISPLAY "TRU TO TEMP STORAGE" AT XFER CAR**	ETCOM		N12	2	12			
5.7.14	**PLC TO PCS DISPLAY "TRU TO TRUPACT" AT XFER CAR**	ETCOM		N12	2	13			
5.7.16	**PLC TO PCS "REQUEST AS/RS DRUM DATABASE" MESSAGE**	ETCOM		N12	2	14			
5.7.17	**PLC TO PCS "DISABLE ALL AS/RS MOVEMENT" MESSAGE**	ETCOM		N12	2	15			
5.7.18	**PLC TO PCS "ENABLE ALL AS/RS MOVEMENT" MESSAGE**	ETCOM		N12	3	0			
AS/RS TO PLC									
5.8.1	**PCS TO PLC "STATUS OF AS/RS SYSTEM" MESSAGE**	ETCOM		N12	4	0			
	EQUIP. STATUS VALUE			N12	10-11				
	SOFTWARE ERROR CODE			N12	14				
	EQUIP. STATUS MESSAGE			N12	15-46				
5.8.2	**PCS TO PLC "AS/RS STORED PALLET FROM PALLET STAND CONFIRM" M**	ETCOM		N12	4	1			
	PALLET STORAGE LOCATION			N12	50-51				
	# OF DRUMS ON PALLET			N12	52				
	DRUM IDENTIFICATIONS			N12	53-84				
5.8.3	**PCS TO PLC "AS/RS RETRIEVED PALLET TO PALLET STAND CONFIRM" M**	ETCOM		N12	4	2			
	PALLET STORAGE LOCATION			N12	90-91				
	# OF DRUMS ON PALLET			N12	92				
	DRUM IDENTIFICATIONS			N12	93-124				
	RETRIEVED PIN NOT IN PICK LIST OR NOT IN 1ST (4) POSITIONS						N121	100	0
5.8.4	**PCS TO PLC "AS/RS STORED PALLET FROM XFER CAR CONFIRM" MESSA**	ETCOM		N12	4	3			
	PALLET STORAGE LOCATION			N12	130-131				
	# OF DRUMS ON PALLET			N12	132				
	DRUM IDENTIFICATIONS			N12	133-164				
5.8.5	**PCS TO PLC "AS/RS RETRIEVED PALLET TO XFER CAR CONFIRM" MESSA**	ETCOM		N12	4	4			
	PALLET STORAGE LOCATION			N12	170-171				
	# OF DRUMS ON PALLET			N12	172				
	DRUM IDENTIFICATIONS			N12	173-204				
5.8.6	**PCS TO PLC "AS/RS DRUM DATABASE" MESSAGE**	NETCOM		N12	4	5			
	NUMBER OF PALLETS			N12	210				
	PALLET STORAGE LOCATION (2 WORDS / PALLET)			N21-N23	ORDS / PALLET				

LCU 104 File 12 PLC Memory Map - AS/RS

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	# DRUMS ON PALLET (1 WORD / PALLET)			N21-N23	LETS / DATA FILE				
	DRUM IDENTIFICATION			N21-N23	ORDS / DATA FILE				
		AS/RS Drum Database							
		PALLET LOC.		# DRUMS	PIN #1	PIN #2	PIN #3	PIN #4	
		N21:0-2		N21:3-4	N21:5-12	N21:13-20	N21:21-28	N21:29-36	
		N21:40-42		N21:43-44	N21:45-52	N21:53-60	N21:61-68	N21:69-76	
			...	...	...	...	...	...	
		N23:	680-682	683-684	685-692	693-700	701-708	709-716	
PLC TO PCS									
	TRANSMIT NETCOMM MESSAGE TO SUPV. MOD.			N12	0	0			
5.3.1	WASTE CONTAINER LOCATION UPDATE	NETCOM		N12	0	1			
Alarm Status (BIT #1 - "On/Off," BIT #2 - "Acknowledged/Unacknowledged")									
NOLOCS	NO LOCATION AVAILABLE IN AS/RS STATUS			N129	0	0-1			
SYS ERR	DRUM NOT FOUND IN AS/RS STATUS			N129	0	2-3			
END OF LCU 104 FILE 12 MEMORY MAP									

LCU 104 File 63 PLC Memory Map - HVAC

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
PLC I/O						
PROCESS ZONE I - GLOVEBOX						
11-XA-611A	EXHAUST FILTER TRAIN CONTROLLER C-11-201-A TROUBLE	DI	I:010/12	N95	010	10
11-XA-611B	EXHAUST FILTER TRAIN CONTROLLER C-11-201-B TROUBLE	DI	I:010/13	N95	010	11
PROCESS ZONE II - PROCESS AREA						
11-PDIT-601	NON-CONFINEMENT/ZONE II PROCESS HVAC DIFFERENTIAL PRESSURE	AI	I:002/06			
11-PDIT-602	NON-CONFINEMENT/ZONE II PROCESS DIFFERENTIAL PRESSURE	AI	I:002/07			
11-PDIT-603	ZONE II PROCESS HVAC/ZONE II PROCESS DIFFERENTIAL PRESSURE	AI	I:002/08			
11-PDIT-606	NON-CONFINEMENT/ATMOSPHERE DIFFERENTIAL PRESSURE	AI	I:005/06			
11-PDIT-607	ATMOSPHERE/ZONE II PROCESS DIFFERENTIAL PRESSURE	AI	I:002/05			
11-XA-601A	PROCESS AREA AHU CONTROLLER, C-11-201A, TROUBLE ALARM	DI	I:010/16	N95	010	14
11-XA-601B	PROCESS AREA AHU CONTROLLER C-11-201A, TROUBLE ALARM	DI	I:011/00	N95	011	00
11-XA-612A	EXHAUST FILTER TRAIN CONTROLLER, C-11-202A TROUBLE ALARM	DI	I:010/14	N95	010	12
11-XA-612B	EXHAUST FILTER TRAIN CONTROLLER, C-11-202B TROUBLE ALARM	DI	I:010/15	N95	010	13
11-ZSC-604	COMMON SUPPLY AIR DAMPER CLOSED	DI	I:011/01	N95	011	01
11-ZSO-604	COMMON SUPPLY AIR DAMPER OPEN	DI	I:011/02	N95	011	02
SHIPPING/RECEIVING/NDE/NDA						
11-XA-621	SHIPPING/RECEIVING AND NDE/NDA AHUC TROUBLE ALARM	DI	I:011/03	N95	011	03
AH-11-101/SD	SHIPPING/RECEIVING AHU RADIATION SHUTDOWN	DO	O:016/00	N700	016	00
COMPUTER & CONTROL ROOM						
11-XA-631A	COMPUTER AND CONTROL ROOM AHU A TROUBLE ALARM	DI	I:010/10	N95	010	8
11-XA-631B	COMPUTER AND CONTROL ROOM AHU B TROUBLE ALARM	DI	I:010/11	N95	010	9
ADMINISTRATION AREA						
11-XA-641	ADMINISTRATION AREA CONTROLLER, C-11-401, TROUBLE ALARM	DI	I:010/04	N95	010	04
ADMINISTRATION AREA - LOCKER ROOM						
11-XA-661	ADMINISTRATION (LOCKER ROOM) AHU CONTROLLER, C-11-301 TROUBL	DI	I:010/05	N95	010	05
CHILLED GLYCOL						
11-TI-652	CHILLED GLYCOL TEMPERATURE	A	I:002/04			
11-XA-651	CHILLED GLYCOL SYSTEM CONTROLLER, 118-C-11-101 TROUBLE ALARM	DI	I:010/06	N95	010	06
SERCOM PCS TO HVAC DCS - Process Zone #1						
11-FI-617A/SP	EXHAUST FLOW SET POINT - TRAIN A, EF-11-201A	V	ARW	N630	0	
11-FI-617B/SP	EXHAUST FLOW SET POINT - TRAIN B, EF-11-201B	V	ARW	N630	8	
FT-11-201A/SP	EXHAUST FILTER TRAIN A STOP PULSE, EF-11-201A	B	DRW	N630	16	

LCU 104 File 63 PLC Memory Map - HVAC

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
FT-11-201A/ST	EXHAUST FILTER TRAIN A START PULSE, EF-11-201A	B	DRW	N630	24	
FT-11-201B/SP	EXHAUST FILTER TRAIN B STOP PULSE, EF-11-201B	B	DRW	N630	32	
FT-11-201B/ST	EXHAUST FILTER TRAIN B START PULSE, EF-11-201B	B	DRW	N630	40	
	SPARE			N630	48	
SERCOM HVAC DCS TO PCS - Process Zone #1						
11-FI-314	TRU GLOVEBOX AIRFLOW	V	ARO	N630	56	
11-FI-316	LLW GLOVEBOX AIRFLOW	V	ARO	N630	60	
11-FI-371	TRU RESTRICTED WASTE GLOVEBOX AIRFLOW	V	ARO	N630	64	
11-FI-391	LLW RESTRICTED WASTE GLOVEBOX AIRFLOW	V	ARO	N630	68	
11-FI-617A	EXHAUST FLOW - TRAIN A, EF-11-201A	V	ARO	N630	72	
11-FI-617B	EXHAUST FLOW - TRAIN B, EF-11-201B	V	ARO	N630	76	
11-PDI-315	TRU GLOVEBOX DIFFERENTIAL PRESSURE	V	ARO	N630	80	
11-PDI-317	LLW GLOVEBOX DIFFERENTIAL PRESSURE	V	ARO	N630	84	
11-PDI-372	TRU RESTRICTED WASTE GLOVEBOX DIFFERENTIAL PRESSURE.	V	ARO	N630	88	
11-PDI-392	LLW RESTRICTED WASTE GLOVEBOX DIFFERENTIAL PRESSURE.	V	ARO	N630	92	
11-PDI-611A	EXHAUST FILTER TRAIN A DIFFERENTIAL PRESSURE, FT-11-201A	V	ARO	N630	96	
11-PDI-611B	EXHAUST FILTER TRAIN B DIFFERENTIAL PRESSURE, FT-11-201B	V	ARO	N630	100	
11-PDISH-611	PRE-FILTER DIRTY - TRAIN A, FT-11-201A	B	DRO	N630	104	
11-PDISH-611	PRE-FILTER DIRTY - TRAIN B, FT-11-201B	B	DRO	N630	108	
11-PDISH-613	FIRST HEPA FILTER DIRTY - TRAIN A, FT-11-201A	B	DRO	N630	112	
11-PDISH-613	FIRST HEPA FILTER DIRTY - TRAIN B, FT-11-201B	B	DRO	N630	116	
11-PDISH-615	SECOND HEPA FILTER DIRTY - TRAIN A, FT-11-201A	B	DRO	N630	120	
11-PDISH-615	SECOND HEPA FILTER DIRTY - TRAIN B, FT-11-201B	B	DRO	N630	124	
11-PDISL-617	EXHAUST FAN NOT RUNNING OR FAILED, EF-11-201A	B	DRO	N630	128	
11-PDISL-617	EXHAUST FAN NOT RUNNING OR FAILED - TRAIN B, EF-11-201B	B	DRO	N630	132	
EF-11-201A/S	EXHAUST FAN, EF-11-201A RUNNING	B	DRO	N630	136	
EF-11-201B/S	EXHAUST FAN, EF-11-201B RUNNING	B	DRO	N630	140	
	SPARE			N630	144	
	SPARE			N630	148	
SERCOM PCS TO HVAC DCS - Process Zone #2						
11-FI-603A/SP	SUPPLY AIR FLOW SET POINT, AH-11-201A	V	ARW	N630	152	
11-TI-609A/SP	PROCESS AREA TEMPERATURE SET POINT, AH-11-201A	V	ARW	N630	160	
11-FI-603B/SP	SUPPLY AIR FLOW SET POINT, AH-11-201B	V	ARW	N630	168	

LCU 104 File 63 PLC Memory Map - HVAC

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
11-TI-609B/SP	PROCESS AREA TEMPERATURE SET POINT, AH-11-201B	V	ARW	N630	176	
11-FI-618A/SP	EXHAUST AIR FLOW SET POINT, EF-202A	V	ARW	N630	184	
11-FI-618B/SP	EXHAUST AIR FLOW SET POINT, EF-202B	V	ARW	N630	192	
AH-11-201A/S	PROCESS AREA AHU START PULSE, AH-11-201A	B	DRW	N630	200	
AH-11-201A/S	PROCESS AREA AHU STOP PULSE, AH-11-201A	B	DRW	N630	208	
AH-11-201B/S	PROCESS AREA AHU START PULSE, AH-11-201B	B	DRW	N630	216	
AH-11-201B/S	PROCESS AREA AHU B STOP PULSE, AH-11-201B	B	DRW	N630	224	
FT-11-202A/ST	EXHAUST FILTER TRAIN START PULSE, FT-11-202A	B	DRW	N630	232	
FT-11-202A/SP	EXHAUST FILTER TRAIN STOP PULSE, FT-11-202A	B	DRW	N630	240	
FT-11-202B/ST	EXHAUST FILTER TRAIN START PULSE, FT-202B	B	DRW	N630	248	
FT-11-202B/SP	EXHAUST FILTER TRAIN STOP PULSE, FT-202B	B	DRW	N630	256	
	SPARE			N630	264	
	SPARE			N630	272	
SERCOM HVAC DCS TO PCS - Process Zone #1						
11-TI-601A	OUTSIDE AIR TEMPERATURE, AH-11-201A	V	ARO	N630	280	
11-TI-605A	SUPPLY AIR TEMPERATURE, AH-11-201A	V	ARO	N630	284	
11-FI-603A	SUPPLY AIR FLOW, AH-11-201A	V	ARO	N630	288	
11-TI-609A	PROCESS AREA TEMPERATURE, AH-11-201A	V	ARO	N630	292	
11-TI-601B	OUTSIDE AIR TEMPERATURE, AH-11-201B	V	ARO	N630	296	
11-TI-605B	SUPPLY AIR TEMPERATURE, AH-11-201B	V	ARO	N630	300	
11-FI-603B	SUPPLY AIR FLOW, AH-11-201B	V	ARO	N630	304	
11-TI-609B	PROCESS AREA TEMPERATURE, AH-11-201B	V	ARO	N630	308	
11-TI-618A	EXHAUST AIR TEMPERATURE, FILTER TRAIN FT-11-202A	V	ARO	N630	312	
11-FI-618A	EXHAUST AIR FLOW, EF-11-202A	V	ARO	N630	316	
11-TI-618B	EXHAUST AIR TEMPERATURE FILTER TRAIN FT-11-202B	V	ARO	N630	320	
11-FI-618B	EXHAUST AIR FLOW, EF-11-202B	V	ARO	N630	324	
11-PDISH-601	PRE-FILTER DIRTY, AH-11-201A	B	DRO	N630	328	
11-PDISH-602	FINAL FILTER DIRTY, AH-11-201A	B	DRO	N630	332	
11-PDISL-603	SUPPLY FAN NOT RUNNING OR FAILED, SF-11-201A	B	DRO	N630	336	
AH-11-201A/S	PROCESS AREA AHU A RUNNING, AH-11-201A	B	DRO	N630	340	
11-PDISH-601	PRE-FILTER DIRTY, AH-11-201B	B	DRO	N630	344	
11-PDISH-602	FINAL FILTER DIRTY, AH-11-201B	B	DRO	N630	348	
11-PDISL-603	SUPPLY FAN NOT RUNNING OR FAILED, SF-11-201B	B	DRO	N630	352	

LCU 104 File 63 PLC Memory Map - HVAC

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <---> Ext. Dev. Reg. Data File	Word	Bit
AH-11-201B/S	PROCESS AREA AHU B RUNNING, AH-11-201B	B	DRO	N630	356	
11-PDISH-612	PRE-FILTER DIRTY, FILTER TRAIN FT-11-202A	B	DRO	N630	360	
11-PDISH-614	FIRST HEPA FILTER DIRTY, FILTER TRAIN FT-11-202A	B	DRO	N630	364	
11-PDISH-616	SECOND HEPA FILTER DIRTY, FILTER TRAIN FT-11-202A	B	DRO	N630	368	
11-PDISL-618	EXHAUST FAN NOT RUNNING OR FAILED, EF-11-202A	B	DRO	N630	372	
FT-11-202A/S	EXHAUST FAN RUNNING, EF-11-202A	B	DRO	N630	376	
11-PDISH-612	PRE-FILTER DIRTY, FILTER TRAIN, FT-11-202B	B	DRO	N630	380	
11-PDISH-614	FIRST HEPA FILTER DIRTY, FILTER TRAIN FT-11-202B	B	DRO	N630	384	
11-PDISH-616	SECOND HEPA FILTER DIRTY, FILTER TRAIN FT-11-202B	B	DRO	N630	388	
11-PDISL-618	EXHAUST FAN NOT RUNNING OR FAILED, EF-11-202B	B	DRO	N630	392	
EF-11-202B/S	EXHAUST FAN RUNNING, EF-11-202B	B	DRO	N630	396	
11-ZSO-608	ZONE II EXHAUST FIRE DAMPER OPEN	B	DRO	N630	400	
11-ZSC-608	ZONE II EXHAUST FIRE DAMPER CLOSED	B	DRO	N630	404	
	SPARE			N630	408	
	SPARE			N630	412	
	SPARE			N630	416	
SERCOM PCS TO HVAC DCS - Shipping/Receiving/NDE/NDA						
11-TI-627/SP	NDE/NDA TEMPERATURE SET POINT, AH-11-101	V	ARW	N630	424	
AH-11-101/ST	AHU START PULSE, AH-11-101	B	DRW	N630	432	
AH-11-101/SP	AHU STOP PULSE, AH-11-101	B	DRW	N630	440	
AH-11-101/QC	OPERATOR OVER-RIDE TO OCCUPIED CYCLE, AH-11-101	B	DRW	N630	448	
AH-11-101/UC	OPERATOR OVER-RIDE TO UNOCCUPIED CYCLE, AH-11-101	B	DRW	N630	456	
	SPARE			N630	464	
SERCOM HVAC DCS TO PCS - Shipping/Receiving/NDE/NDA						
11-TI-621	MIXED AIR TEMPERATURE, AH-11-101	V	ARO	N630	472	
11-TI-626	SUPPLY AIR TEMPERATURE, AH-11-101	V	ARO	N630	476	
11-TI-627	NDE/NDA AREA TEMPERATURE, AH-11-101	V	ARO	N630	480	
11-PDISL-624	RETURN FAN NOT RUNNING OR FAILED, RF-11-101	B	DRO	N630	484	
11-PDISH-621	PRE-FILTER DIRTY, AH-11-101	B	DRO	N630	488	
11-PDISH-622	FINAL FILTER DIRTY, AH-11-101	B	DRO	N630	492	
11-PDISL-623	SUPPLY FAN NOT RUNNING OR FAILED, SF-11-101	B	DRO	N630	496	
SF-11-101/S	SHIPPING/RECEIVING AND NDE/NDA SUPPLY FAN RUNNING, SF-11-101	B	DRO	N630	500	
RF-11-101/S	SHIPPING/RECEIVING AND NDE/NDA RETURN FAN RUNNING, RF-11-101	B	DRO	N630	504	

LCU 104 File 63 PLC Memory Map - HVAC

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
SPARE				N630	508	
SERCOM PCS TO HVAC DCS - Computer & Control Room						
11-TI-632A/SP	CONTROL ROOM TEMPERATURE SET POINT, AH-11-501A	V	ARW	N630	512	
11-MI-632A/S	CONTROL ROOM HUMIDITY SET POINT, AH-11-501A	V	ARW	N630	520	
11-TI-632B/SP	CONTROL ROOM TEMPERATURE SET POINT, AH-11-501B	V	ARW	N630	528	
11-MI-632B/SP	CONTROL ROOM HUMIDITY SET POINT, AH-11-501B	V	ARW	N630	536	
AH-11-501A/S	AHU START PULSE, AH-11-501A	B	DRW	N630	544	
AH-11-501A/S	AHU STOP PULSE, AH-11-501A	B	DRW	N630	552	
AH-11-501B/S	AHU START PULSE, AH-11-501B	B	DRW	N630	560	
AH-11-501B/S	AHU STOP PULSE, AH-11-501B	B	DRW	N630	568	
SPARE				N630	576	
SERCOM HVAC DCS TO PCS - Computer & Control Room						
11-TI-635A	MIXED AIR TEMPERATURE, AH-11-501A	V	ARO	N630	584	
11-TI-637A	SUPPLY AIR TEMPERATURE, AH-11-501A	V	ARO	N630	588	
11-MI-632A	CONTROL ROOM HUMIDITY, AH-11-501A	V	ARO	N630	592	
11-TI-632A	CONTROL ROOM TEMPERATURE, AH-11-501A	V	ARO	N630	596	
11-TI-635B	MIXED AIR TEMPERATURE, AH-11-501B	V	ARO	N630	600	
11-TI-637B	SUPPLY AIR TEMPERATURE, AH-11-501B	V	ARO	N630	604	
11-MI-632B	CONTROL ROOM HUMIDITY, AH-11-501B	V	ARO	N630	608	
11-TI-632B	CONTROL ROOM TEMPERATURE, AH-11-501B	V	ARO	N630	612	
11-PDISL-633	SUPPLY FAN NOT RUNNING OR FAILED, SF-11-501A	B	DRO	N630	616	
11-PDISH-631	PRE-FILTER DIRTY, AH-11-501A	B	DRO	N630	620	
11-PDISH-632	FINAL FILTER DIRTY, AH-11-501A	B	DRO	N630	624	
SF-11-501A/S	SUPPLY FAN, SF-11-501A RUNNING	B	DRO	N630	628	
11-PDISL-633	SUPPLY FAN NOT RUNNING OR RAILED, SF-11-501B	B	DRO	N630	632	
11-PDISH-631	PRE-FILTER DIRTY, AH-11-501B	B	DRO	N630	636	
11-PDISH-632	FINAL FILTER DIRTY, AH-11-501B	B	DRO	N630	640	
SF-11-501B/S	SUPPLY FAN, SF-11-501B RUNNING	B	DRO	N630	644	
SPARE				N630	648	
SERCOM PCS TO HVAC DCS - Administration Area						
AH-11-401/ST	AHU START PULSE, AH-11-401	B	DRW	N630	652	
AH-11-401/SP	AHU STOP PULSE, AH-11-401	B	DRW	N630	660	
AH-11-401/OC	OPERATOR OVER-RIDE TO OCCUPIED CYCLE, AH-11-401	B	DRW	N630	668	

LCU 104 File 63 PLC Memory Map - HVAC

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
AH-11-401/UC	OPERATOR OVER-RIDE TO UNOCCUPIED CYCLE, AH-11-401	B	DRW	N630	676	
SPARE				N630	684	
SerCom HVAC DCS To PCS - Administration Area						
11-TI-641	OUTSIDE AIR TEMPERATURE, AH-11-401	V	ARO	N630	692	
11-TI-642	MIXED AIR TEMPERATURE, AH-11-401	V	ARO	N630	696	
11-TI-645	SUPPLY AIR TEMPERATURE, AH-11-401	V	ARO	N630	700	
11-FI-643	SUPPLY AIR FLOW, AH-11-401	V	ARO	N630	704	
11-PDI-645	SUPPLY AIR PRESSURE, AH-11-401	V	ARO	N630	708	
11-FI-642	RETURN AIR FLOW, RF-11-401	V	ARO	N630	712	
11-PDISL-644	RETURN FAN NOT RUNNING OR FAILED, RF-11-401	B	DRO	N630	716	
11-PDISH-641	PRE-FILTER DIRTY, AH-11-401	B	DRO	N630	720	
11-PDISH-642	FINAL FILTER DIRTY, AH-11-401	B	DRO	N630	724	
11-PDISL-643	SUPPLY FAN NOT RUNNING OR FAILED, AH-11-401	B	DRO	N630	728	
SF-11-401/S	ADMINISTRATION AREA SUPPLY FAN, SF-11-401 RUNNING	B	DRO	N630	732	
RF-11-401/S	ADMINISTRATION AREA RETURN FAN, RF-11-401 RUNNING	B	DRO	N630	736	
SPARE				N630	740	
SERCOM PCS TO HVAC DCS - Administration Area (Locker Room)						
11-TI-668/SP	LOCKER ROOM AREA TEMPERATURE SET POINT, AH-11-301	V	ARW	N630	744	
AH-11-301/ST	AHU START PULSE, AH-11-301	B	DRW	N630	752	
AH-11-301/SP	AHU STOP PULSE, AH-11-301	B	DRW	N630	760	
AH-11-301/OC	OPERATOR OVER-RIDE TO OCCUPIED CYCLE, AH-11-301	B	DRW	N630	768	
AH-11-301/UC	OPERATOR OVER-RIDE TO UNOCCUPIED CYCLE, AH-11-301	B	DRW	N630	776	
SPARE				N630	784	
SERCOM HVAC DCS TO PCS - Administration Area (Locker Room)						
11-TI-665	SUPPLY AIR TEMPERATURE, AH-11-301	V	ARO	N630	792	
11-TI-668	LOCKER ROOM AREA TEMPERATURE, AH-11-301	V	ARO	N630	796	
11-PDISH-661	PRE-FILTER DIRTY, AH-11-301	B	DRO	N630	800	
11-PDISH-662	FINAL FILTER DIRTY, AH-11-301	B	DRO	N630	804	
11-PDISL-663	SUPPLY FAN NOT RUNNING OR FAILED, SF-11-301	B	DRO	N630	808	
EF-11-301/S	EXHAUST FAN RUNNING	B	DRO	N630	812	
AH-11-301/S	ADMINISTRATION (LOCKER ROOM) AHU RUNNING	B	DRO	N630	816	
SPARE				N630	820	
SERCOM PCS TO HVAC DCS - Chilled Glycol						

LCU 104 File 63 PLC Memory Map - HVAC

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg. Data File	Word	Bit
P-11-101A/ST	CHILLED GLYCOL DISTRIBUTION PUMP A START PULSE	B	DRW	N630	828	
P-11-101A/SP	CHILLED GLYCOL DISTRIBUTION PUMP A STOP PULSE	B	DRW	N630	836	
P-11-101B/ST	CHILLED GLYCOL DISTRIBUTION PUMP B START PULSE	B	DRW	N630	844	
P-11-101B/SP	CHILLED GLYCOL DISTRIBUTION PUMP B STOP PULSE	B	DRW	N630	852	
P-11-102A/ST	CHILLER CIRCULATION PUMP A START PULSE	B	DRW	N630	860	
P-11-102A/SP	CHILLER CIRCULATION PUMP A STOP PULSE	B	DRW	N630	868	
P-11-102B/ST	CHILLER CIRCULATION PUMP B START PULSE	B	DRW	N630	876	
P-11-102B/SP	CHILLER CIRCULATION PUMP B STOP PULSE	B	DRW	N630	884	
SPARE				N630	892	
SERCOM HVAC DCS TO PCS - Chilled Glycol						
11-FI-652	CHILLED GLYCOL PRIMARY-SECONDARY BRIDGE FLOW	V	ARO	N630	896	
P-11-101A/S	CHILLED GLYCOL DISTRIBUTION PUMP P-11-101A RUNNING	B	DRO	N630	900	
P-11-101B/S	CHILLED GLYCOL DISTRIBUTION PUMP P-11-101B RUNNING	B	DRO	N630	904	
P-11-102A/S	CHILLER CIRCULATION PUMP P-11-102A RUNNING	B	DRO	N630	908	
P-11-102B/S	CHILLER CIRCULATION PUMP P-11-102B RUNNING	B	DRO	N630	912	
SPARE				N630	916	
END OF LCU 104 FILE 63 MEMORY MAP						

LCU 104 File 64 PLC Memory Map - Health Physics Monitors

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit
PLC I/O						
ISOKINETIC STACK EFFLUENT MONITORING SYSTEM						
12-FQ-553	ISEM FLOW TOTALIZER	AI	I:004/08	N631	51	
12-FT-550	ISEM RECORD SAMPLER FLOW TRANSMITTER	AI	I:005/04	N631	67	
12-FT-551	ISEM ALPHA CAM FLOW TRANSMITTER	AI	I:005/02	N631	65	
12-FT-552	BETA CAM FLOW TRANSMITTER	AI	I:005/03	N631	66	
12-FT-553	ISEM FLOW	AI	I:005/01	N631	64	
12-RIT-551	ISEM ALPHA CAM RADIATION LEVEL	AI	I:004/06	N631	49	
12-RIT-552	ISEM BETA CAM RADIATION LEVEL	AI	I:004/07	N631	50	
12-TT-553	ISEM TEMPERATURE	AI	I:004/05	N631	48	
12-FSL-550	ISEM RECORD SAMPLER LOW FLOW SW	DI	I:013/13	N95	13	11
12-FSL-551	ISEM ALPHA CAM LOW FLOW SW	DI	I:013/11	N95	13	9
12-FSL-552	ISEM BETA CAM LOW FLOW SW	DI	I:013/12	N95	13	10
12-RSH-551	ISEM ALPHA CAM HIGH RADIATION ALARM	DI	I:013/04	N95	13	4
12-RSH-552	ISEM BETA CAM HIGH RADIATION ALARM	DI	I:013/06	N95	13	6
12-XS-551	ISEM ALPHA CAM TROUBLE	DI	I:013/05	N95	13	5
12-XS-552	ISEM BETA CAM TROUBLE	DI	I:013/10	N95	13	8
AREA RADIATION MONITORS - GAMMA						
12-RIT-505	PROCESS AREA GAMMA RADIATION LEVEL TRANSMITTER	AI	I:003/01	N631	24	
12-RIT-506	SHIP/REC. AREA GAMMA RADIATION LEVEL TRANSMITTER	AI	I:004/01	N631	44	
12-RIT-507	SHIP/REC. AREA GAMMA RADIATION LEVEL TRANSMITTER	AI	I:004/02	N631	45	
12-RIT-508	PROCESS AREA GAMMA RADIATION LEVEL TRANSMITTER	AI	I:003/02	N631	25	
12-RSH-505	PROCESS AREA HIGH LEVEL GAMMA RADIATION ALARM	DI	I:011/14	N95	11	12
12-RSH-506	SHIP/REC. AREA HIGH LEVEL GAMMA RADIATION ALARM	DI	I:011/13	N95	11	11
12-RSH-507	SHIP/REC. AREA HIGH LEVEL GAMMA RADIATION ALARM	DI	I:013/03	N95	13	3
12-RSH-508	PROCESS AREA HIGH LEVEL GAMMA RADIATION ALARM	DI	I:011/04	N95	11	04
12-XS-505	PROCESS AREA GAMMA INSTRUMENT TROUBLE	DI	I:012/01	N95	12	01
12-XS-506	SHIP/REC. AREA GAMMA INSTRUMENT TROUBLE	DI	I:012/02	N95	12	02
12-XS-507	SHIP/REC. AREA GAMMA INSTRUMENT TROUBLE	DI	I:012/03	N95	12	03
12-XS-508	PROCESS AREA GAMMA INSTRUMENT TROUBLE	DI	I:012/04	N95	12	04
PC-12-120/RA	SHIP/REC. ENTRANCE WARNING AND LOCAL AREA ALARM RELAY	DO: LCU 101		N96	0	
PC-12-300/RA	PROCESS ENTRANCE WARNING AND LOCAL AREA ALARM RELAY	DO	O:016/04	N95	16	04
UA-12-110/RA	RADIATION HIGH ALARM TO PLANT ANNUNCIATOR	DO	O:016/01	N95	16	01

LCU 104 File 64 PLC Memory Map - Health Physics Monitors

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit
UA-12-110/RT	SYSTEM TROUBLE ALARM TO PLANT ANNUNCIATOR	DO	O:016/02	N95	16	02
AREA & GLOVEBOX EXHAUST CONTINUOUS AIR MONITORS - ALPHA						
12-RITA-502	TRU RWM G.B. VENT DUCT ALPHA CAM TRANSMITTER	AI	I:004/04	N631	47	
12-RITA-504	TRU PROCESS G.B. VENT DUCT ALPHA CAM TRANSMITTER	AI	I:004/03	N631	46	
12-RITA-509	PROCESS AREA ALPHA CAM TRANSMITTER	AI	I:003/03	N631	26	
12-RITA-510	NDE/NDA AREA ALPHA CAM TRANSMITTER	AI: LCU 101		N96	163	
12-RITA-511	SHIP/REC. AREA ALPHA CAM TRANSMITTER	AI: LCU 101		N96	164	
12-RITA-512	PROCESS HVAC AREA ALPHA CAM TRANSMITTER	AI	I:003/07	N631	30	
12-RITA-545	PROCESS AREA ALPHA CAM TRANSMITTER	AI	I:003/06	N631	29	
12-RSH-502	TRU RWM G.B. VENT DUCT ALPHA CAM HIGH RADIATION ALARM	DI	I:013/01	N95	13	01
12-RSH-504	TRU PROCESS G.B. VENT DUCT ALPHA CAM HIGH RADIATION ALARM	DI	I:013/00	N95	13	00
12-RSH-509	PROCESS AREA ALPHA CAM HIGH RADIATION ALARM	DI	I:011/05	N95	11	05
12-RSH-510	NDE/NDA ALPHA CAM HIGH RADIATION ALARM	DI: LCU 101		N96	170	
12-RSH-511	SHIP/REC. ALPHA CAM HIGH RADIATION ALARM	DI: LCU 101		N96	170	
12-RSH-512	PROCESS HVAC ALPHA CAM HIGH RADIATION ALARM	DI	I:012/12	N95	12	10
12-RSH-545	PROCESS ALPHA CAM HIGH RADIATION ALARM	DI	I:012/00	N95	12	00
12-XS-502	TRU RWM G.B. VENT DUCT ALPHA CAM TROUBLE	DI	I:013/02	N95	13	02
12-XS-504	TRU PROCESS G.B. VENT DUCT ALPHA CAM TROUBLE	DI	I:012/16	N95	12	14
12-XS-509	PROCESS AREA ALPHA CAM TROUBLE	DI	I:012/05	N95	12	05
12-XS-510	NDE/NDA AREA ALPHA CAM TROUBLE	DI: LCU 101		N96	170	
12-XS-511	SHIP/REC. AREA ALPHA CAM TROUBLE	DI: LCU 101		N96	170	
12-XS-512	PROCESS HVAC ALPHA CAM TROUBLE	DI	I:012/14	N95	12	12
12-XS-545	PROCESS ALPHA CAM TROUBLE	DI	I:012/11	N95	12	9
PC-12-400/RA	NDE/NDA AREA ALARM AND ENTRANCE WARNING RELAY	DO: LCU 101		N96	180	
PC-12-600/RA	PROCESS HVAC AREA ALARM AND ENTRANCE WARNING RELAY	DO	O:016/05	N96	16	05
AREA & GLOVEBOX EXHAUST CONTINUOUS AIR MONITORS - BETA						
12-RITA-501	LLW RWM G.B. VENT DUCT BETA CAM TRANSMITTER	AI: LCU 102		N96	190	
12-RITA-503	LLW PROCESS G.B. VENT DUCT BETA CAM TRANSMITTER	AI: LCU 102		N96	191	
12-RITA-513	PROCESS AREA BETA CAM TRANSMITTER	AI	I:003/04	N631	27	
12-RITA-514	NDE/NDA AREA BETA CAM TRANSMITTER	AI: LCU 101		N96	193	
12-RITA-515	SHIP/REC AREA BETA CAM TRANSMITTER	AI: LCU 101		N96	194	
12-RITA-516	PROCESS HVAC AREA G.B. VENT DUCT BETA CAM TRANSMITTER	AI	I:003/08	N631	31	
12-RITA-544	PROCESS AREA BETA CAM TRANSMITTER	AI	I:003/05	N631	28	

LCU 104 File 64 PLC Memory Map - Health Physics Monitors

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit
12-RSH-501	LLW RWM G.B. VENT DUCT BETA CAM HIGH RADIATION ALARM	DI	I:011/11	N95	11	9
12-RSH-503	LLW PROCESS G.B. VENT DUCT BETA CAM HIGH RADIATION ALARM	DI	I:011/10	N95	11	8
12-RSH-513	PROCESS AREA BETA CAM HIGH RADIATION ALARM	DI	I:011/15	N95	11	13
12-RSH-514	NDE/NDA AREA BETA CAM HIGH RADIATION ALARM	DI: LCU 101		N96	200	
12-RSH-515	SHIP/REC AREA BETA CAM HIGH RADIATION ALARM	DI: LCU 101		N96	200	
12-RSH-516	PROCESS HVAC AREA BETA CAM HIGH RADIATION ALARM	DI	I:012/13	N95	12	11
12-RSH-544	PROCESS AREA BETA CAM HIGH RADIATION ALARM	DI	I:011/16	N95	11	14
12-XS-501	LLW RWM G.B. VENT DUCT BETA CAM TROUBLE	DI	I:011/12	N95	11	10
12-XS-503	LLW PROCESS G.B. VENT DUCT BETA CAM TROUBLE	DI	I:011/06	N95	11	06
12-XS-513	PROCESS AREA BETA CAM TROUBLE	DI	I:012/06	N95	12	06
12-XS-514	NDE/NDA AREA BETA CAM TROUBLE	DI: LCU 101		N96	200	
12-XS-515	SHIP/REC. AREA BETA CAM TROUBLE	DI: LCU 101		N96	200	
12-XS-516	PROCESS HVAC AREA BETA CAM TROUBLE	DI	I:012/15	N95	12	13
12-XS-544	PROCESS AREA ALPHA BETA TROUBLE	DI	I:012/10	N95	12	8
PC-12-120/RA	SHIP/REC. ENTRANCE WARNING AND LOCAL AREA ALARM RELAY	DO				
PC-12-300/RA	PROCESS ENTRANCE WARNING AND LOCAL AREA ALARM RELAY	DO				
UA-12-110/RA	RADIATION HIGH ALARM TO PLANT ANNUNCIATOR	DO				
UA-12-110/RT	SYSTEM TROUBLE ALARM TO PLANT ANNUNCIATOR	DO				
PC-12-400/RA	NDE/NDA AREA ALARM AND ENTRANCE WARNING RELAY	DO				
PC-12-600/RA	PROCESS HVAC AREA ALARM AND ENTRANCE WARNING RELAY	DO				
CRITICALITY MONITORING SYSTEM						
12-RIT-517A	CRITICALITY DETECTOR A RADIATION LEVEL TRANSMITTER	AI	I:002/01	N631	4	
12-RIT-517B	CRITICALITY DETECTOR B RADIATION LEVEL TRANSMITTER	AI	I:002/02	N631	5	
12-RIT-517C	CRITICALITY DETECTOR C RADIATION LEVEL TRANSMITTER	AI	I:002/03	N631	6	
12-RSH-517	CRITICALITY ALARM	DI	I:010/00	N95	10	00
12-XS-517A	CRITICALITY DETECTOR A TROUBLE	DI	I:010/01	N95	10	01
12-XS-517B	CRITICALITY DETECTOR B TROUBLE	DI	I:010/02	N95	10	02
12-XS-517C	CRITICALITY DETECTOR C TROUBLE	DI	I:010/03	N95	10	03
UA-12-110/CT	CRITICALITY SYS TROUBLE TO CONTROL ROOM ANNUNCIATOR	DO	O:016/10	N96	16	8
PCS TO DMS						
DMS TO PCS						
5.4.14	CRITICALITY ALERT MESSAGE	NETCOM				
	MESSAGE GENERAL/SPECIFIC TYPE					

LCU 104 File 64 PLC Memory Map - Health Physics Monitors

Tag Name	Local Control Unit 104	Type	I/O Address	PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit
	CRITICALITY LOCATION					
	CONTAINER IDENTIFICATION					
	ALARM LEVEL					
5.4.17	**FACILITY CURIE LEVEL MESSAGE**	NETCOM				
	MESSAGE GENERAL/SPECIFIC TYPE					
	CURRENT LEVEL (GRAMS)					
	ALARM EXISTING					
END OF LCU 104 FILE 64 MEMORY MAP						

LCU 104 File 65 PLC Memory Map - Facilities Miscellaneous

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
PLC I/O									
FIRE PROTECTION SYSTEM									
13-XS-581A	FIRE PROTECTION SYSTEM FIRE ALARM	DI	I:014/10				N95	230	0
13-XS-581B	FIRE PROTECTION SYSTEM TROUBLE	DI	I:014/11				N95	230	1
ELECTRICAL POWER SYSTEM									
13-ESL-031	BUS DUCT BD-13-101 UNDER VOLTAGE	DI	I:014/02				N95	240	0
13-ESL-032	BUS DUCT BD-13-102 UNDER VOLTAGE	DI	I:014/03				N95	240	1
13-XS-031	TRANSFORMER T-13-101 TROUBLE	DI	I:014/04				N95	240	2
13-XS-032	TRANSFORMER T-13-102 TROUBLE	DI	I:014/05				N95	240	3
13-XS-033	UNINTERRUPTIBLE POWER SUPPLY TROUBLE	DI	I:014/06				N95	240	4
COMPRESSED AIR									
13-PIT-016	COMPRESSED AIR DISTRIBUTION PRESSURE TRANSMITTER	AI	I:005/05				N95	250	
13-XS-011	AIR COMPRESSOR 118-C-13-101A TROUBLE SW.	DI	I:013/14				N95	260	0
13-XS-012	AIR COMPRESSOR 118-C-13-101B TROUBLE SW.	DI	I:013/16				N95	260	1
13-XS-015	INSTRUMENT AIR DRYER PACKAGE TROUBLE SW.	DI	I:014/01				N95	260	2
13-ZS-011	AIR COMPRESSOR 118-C-13-101A RUN STATUS SW.	DI	I:013/15				N95	260	3
13-ZS-012	AIR COMPRESSOR 118-C-13-101B RUN STATUS SW.	DI	I:014/00				N95	260	4
PCS TO DMS									
DMS TO PCS									
5.4.14	CRITICALITY ALERT MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CRITICALITY LOCATION								
	CONTAINER IDENTIFICATION								
	ALARM LEVEL								
5.4.17	FACILITY CURIE LEVEL MESSAGE	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CURRENT LEVEL (GRAMS)								
	ALARM EXISTING								
END OF LCU 104 FILE 65 MEMORY MAP									

LCU 104 File 66 PLC Memory Map - HVAC Supervisory Control

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
Submodule 7.4.4 - HVAC Supervisory Control {HVAC_SUPV}									
PCS TO DMS									
	PREPARE TO RECEIVE PCS DATA								
	READY TO RECEIVE DMS DATA								
	DMS DATA RECEIVED								
5.3.1	**WASTE CONTAINER LOCATION UPDATE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	CONTAINER(S) LOCATION								
	PALLET BIN LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								
5.3.22	**REQUEST STATUS OF DMS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.3.25	**STATUS OF PCS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	DATE/TIME								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								
	SOFTWARE ERROR CODE								
	SOFTWARE ERROR MESSAGE								
5.3.26	**REQUEST CONTAINER INFORMATION MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CONTAINER ID								
DMS TO PCS									
	PREPARE TO RECEIVE DMS DATA								
	READY TO RECEIVE PCS DATA								
	PCS DATA RECEIVED								
5.4.1	**WASTE CONTAINER LOCATION UPDATE (DRUMS ACCEPTED) MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CONTAINER LOCATION								
	NUMBER CONTAINERS								
	CONTAINER IDENTIFICATIONS								

LCU 104 File 66 PLC Memory Map - HVAC Supervisory Control

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
5.4.2	**FISSILE INVENTORY LEVEL**								
	AREA LOCATION			N66	160				
	CURRENT LEVEL (GRAMS)			N66	161-162				
	ALARM EXISTING			N66	163				
5.4.3	**PROCESSING PICK LIST ITEM MESSAGE**	NETCOM							
	NUMBER PICK LIST ITEMS (100 DRUMS MAX.)		N66	170					
	CONTAINER IDENTIFICATION(S) (8 WORDS / DRUM)		N27-N28	ORDS / DRUM					
	PROCESS ROUTE (2 WORDS / DRUM)		N27-N28	UMS / DATA FILE					
	SAMPLE? (1 BIT / DRUM)		N27-N28	ORDS / DATA FILE)					
	COMPLIANT? (1 BIT / DRUM)		N27-N28						
					Processing Pick List				
					DRUM #1	N27:0-7	N27:8-10	N27:11/0	N27:11/8
					DRUM #2	27:16-2	N27:14-26	N27:27/0	N27:27/8
					...	...	...	...	...
					DRUM #100	28:784-7	N28:792-794	N28:795/0	N28:795/8
5.4.3	**PROCESSING PICK LIST ITEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	NUMBER PICK LIST ITEMS								
	CONTAINER IDENTIFICATION(S)								
	PROCESS ROUTE								
	SAMPLE?								
	COMPLIANT?								
5.4.4	**TRANSFER CAR PICK LIST**	NETCOM							
	NUMBER PICK LIST ITEMS (1 DRUM MAX.)			N66	171				
	CONTAINER IDENTIFICATION (8 WORDS / DRUM)			N26	0-7				
5.4.5	**LLW SHIPPING PICK LIST**	NETCOM					**LLW Shipping Pick List**		
	NUMBER PICK LIST ITEMS (50 DRUMS MAX.)			N66	172	N26:8-15	N26:16-23	...	N26:400-407

LCU 104 File 66 PLC Memory Map - HVAC Supervisory Control

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
	CONTAINER IDENTIFICATION (8 WORDS / DRUM)			N26	8-407				
5.4.6	**TRU SHIPPING PICK LIST**	NETCOM					**TRU Shipping Pick List**		
	NUMBER PICK LIST ITEMS (50 DRUMS MAX.)			N66	173	N24:0-7	N24:8-15	. . .	N24:392-399
	CONTAINER IDENTIFICATION (8 WORDS / DRUM)			N24	0-399				
5.4.7	**TRUPACT ASSEMBLY PICK LIST**	NETCOM					**TRUPACT Assembly Pick List**		
	NUMBER PICK LIST ITEMS (50 DRUMS MAX.)			N66	174	24:400-4	N24:408-415	. . .	N24:792-799
	CONTAINER IDENTIFICATION (8 WORDS / DRUM)			N24	400-799				
5.4.12	**STATUS OF DMS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	EQUIP. STATUS VALUE								
	EQUIP. STATUS MESSAGE								
	SOFTWARE ERROR CODE								
	SOFTWARE ERROR MESSAGE								
5.4.14	**CRITICALITY ALERT MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CRITICALITY LOCATION								
	CONTAINER IDENTIFICATION								
	ALARM LEVEL								
5.4.15	**REQUEST STATUS OF PCS SYSTEM MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.16	**CONTAINER DATABASE INFO MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
5.4.17	**FACILITY CURIE LEVEL MESSAGE**	NETCOM							
	MESSAGE GENERAL/SPECIFIC TYPE								
	CURRENT LEVEL (GRAMS)								
	ALARM EXISTING								
Alarm Status (BIT(0) - "On/Acknowledged," BIT(1) - "On/Unacknowledged," BIT(2) - "Off")									
13-XA-581A	**FIRE PROTECTION SYSTEM FIRE ALARM**						N109	500	
13-XA-581B	**FIRE PROTECTION SYSTEM TROUBLE**						N109	501	
13-XA-031	**TRANSFORMER T-13-101 TROUBLE ALARM**						N109	502	
13-EAL-031	**BUS DUCT BD-13-101 UNDER VOLTAGE ALARM**						N109	503	
13-XA-032	**TRANSFORMER T-13-102 TROUBLE ALARM**						N109	504	
13-EAL-032	**BUS DUCT BD-13-102 UNDER VOLTAGE ALARM**						N109	505	

LCU 104 File 66 PLC Memory Map - HVAC Supervisory Control

Tag Name	Local Control Unit 104	Type	I/O Address	Internal Register			PLC <--> Ext. Dev. Reg.		
				Data File	Word	Bit	Data File	Word	Bit
13-XA-033	UNINTERRUPTIBLE POWER SUPPLY TROUBLE ALARM						N109	506	
13-XA-011	AIR COMPRESSOR 118-C-13-101A TROUBLE						N109	507	
13-XA-012	AIR COMPRESSOR 118-C-13-101B TROUBLE						N109	508	
13-XA-015	INSTRUMENT AIR DRYER PACKAGE TROUBLE						N109	509	
13-PAL-016	COMPRESSED AIR DISTRIBUTION PRESSURE LOW ALARM						N109	510	
END OF LCU 104 FILE 66 MEMORY MAP									

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	WRAP Engineering	Date 02/01/99
Project Title/Work Order		EDT No. EDT-623511
WRAP Plant Control System, System Design Description		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
JF Berger	T4-52	X			
HC Boynton	T4-52				X
JC Givens	T4-52				X
JK Kersten	T4-52	X			
MP Lane	T4-52	X			
ME Palmer	T4-52	X			
LW Roberts	T4-51	X			
WA Robertson	T4-51	X			
WR Thackaberry	T4-52				X
DH Watson, Jr.	T4-05				X
JR Weidert	T4-52				X
DOE/RL Reading Room	H2-53	X			
Engineering Files	B1-07	X			